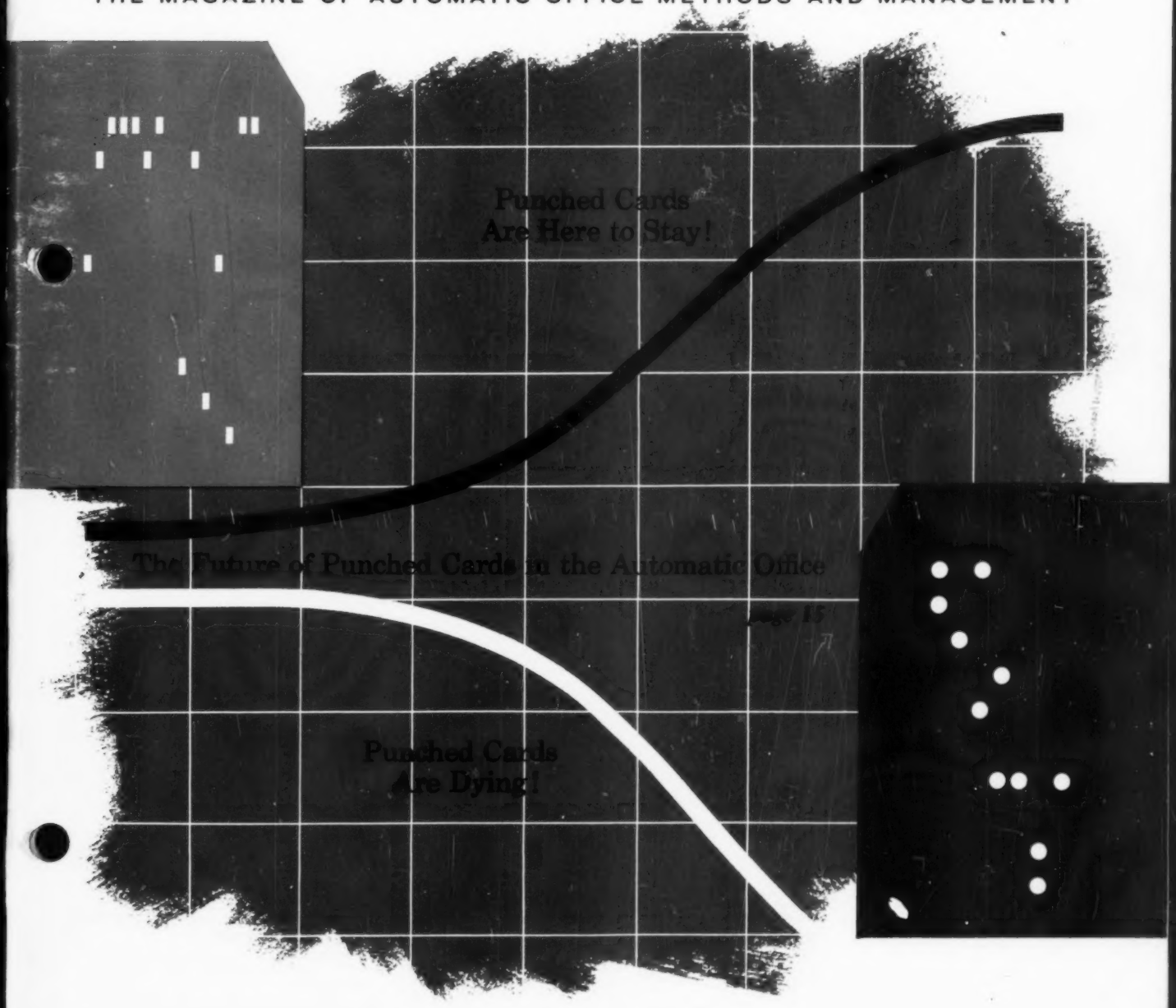
CHARTER ISSUE—NOVEMBER/DECEMBER-1958

MACHINE ACCOUNTING AND DATA PROCESSING

THE MAGAZINE OF AUTOMATIC OFFICE METHODS AND MANAGEMENT



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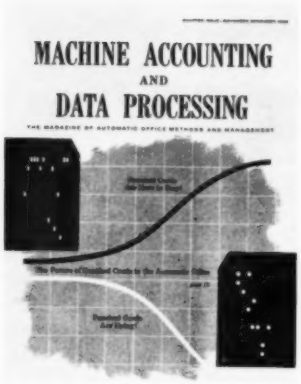
MACHINE ACCOUNTING AND DATA PROCESSING

Volume One • Number One



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OBSERVATIONS . . .

from the publisher . . .

DATA PROCESSING is a relatively new field. Most punched card equipment now in use was obtained within the past ten years. Electronic computers appeared on the business scene only about six years ago. Punched tape attachments to conventional office equipment are even newer.

It is natural that with the development of any new field a communications medium will follow it closely. Such has been the case in the data processing field as for the past seven years we have produced the publication known as THE PUNCHED CARD. Its widespread acceptance has paved the way for this new magazine.

MACHINE ACCOUNTING and DATA PROCESSING includes material related to *methods* and *management* in "the automatic office." This material is designed to serve both practitioners and planners in the field.

Management will be interested in the principles that are important in establishing a most effective data processing activity. Management will gain better control through more accurate and timely reports, usually at a reduced cost.

Managers will find valuable aids for improving their operations by getting the most out of the company investment in men and machines.

EDUCATION will receive continued and concerted attention for without well-trained personnel the great advances in equipment cannot be put to practical use.

News material on equipment, services, supplies, texts, conferences, and the like, will give the reader current information on sources that can serve him further in effecting the most productive data processing operations.

Each issue of MACHINE ACCOUNTING and DATA PROCESSING has a theme—a primary area of interest around which it is built.

This charter issue has been developed around the theme, *"The Future of Punched Cards in the Automatic Office."*

Succeeding issues will carry as theme features—

"The Role of Punched Paper Tape in the Automatic Office"

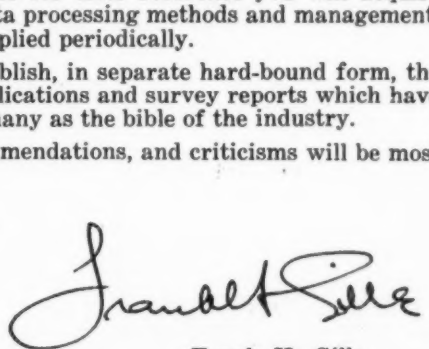
"A Closer Look at Computer Feasibility"

"Getting the Most from Your Supplies, Services and Card and Tape Handling Equipment."

By retaining each issue for later reference you will acquire an effective library of data processing methods and management. A cross-index will be supplied periodically.

We will continue to publish, in separate hard-bound form, the reference volumes of applications and survey reports which have come to be regarded by many as the bible of the industry.

Your comments, recommendations, and criticisms will be most welcome.



Frank H. Gille

MACHINE ACCOUNTING AND DATA PROCESSING

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THE AUTHORS

ERWIN BRENMAN *("Punched Cards Are Here to Stay!")* has had extensive experience in the data processing field. An active member in several organizations, he has taught courses in punched card systems at major universities in the United States. As representative of the Bureau of the Budget of the City of New York, he is responsible for reviewing the needs of more than forty separate punched card installations in various city agencies. Currently he is supervising the installation of an IBM 705. His views on the future of punched cards are presented, therefore, with a full appreciation of the power of large-scale electronic computers.

STANLEY C. MILLER *("Punched Cards Are Dying!")*, formerly the Assistant Controller at Pharmaceuticals, Incorporated, was recently appointed Director of their EDP Division. He received his education at Seton Hall University. A member of the National Cost Accountants Association and the National Machine Accountants Association, Mr. Miller was the Proceedings Chairman for the 1958 Conference of the latter organization.

WILLIAM E. CHARLTON *("Rental vs. Purchase")* is Manager of the Data Processing Division of The Curtis Publishing Company where he directs the operation of one of the largest EAM and EDP installations in private industry. With a background of fifteen years in Methods and Procedures, he was responsible for the conversion of the company operation to punched card processing. He is actively engaged as seminar leader and speaker in the National Machine Accountants Association, Advanced Business Systems Conference at the University of Pennsylvania, the National Business Forms Conference and many educational programs.

JACK MITCHELL *("Job Cost Estimating")*, as Director of Systems and Procedures at Teleregister Corporation, is responsible for cost estimating, cost accounting and cost control systems. He has a broad background in analyzing office operations and planning conversion to punched card and other mechanized systems, training personnel on these systems after conversion, and writing final instruction manuals.

ISRAEL DIAMOND *("Special Purpose Equipment")* has had an extensive career in the field of data processing. He obtained a degree in Business Administration from City College of New York and subsequently held various positions, including Head of Tabulating Division at Olde Tyme Distillers and at Knickerbocker Liquors. He joined Broadcast Music, Incorporated in 1941 for the purpose of installing their first punched card equipment and has been with them since.

JACK PERLSTEIN *("Scheduling in the Data Processing Department")*, Manager of Schering Corporation's Tabulating Department, was in charge of the original installation of punched card equipment. He received his education in accountancy at C.C.N.Y., N.Y.U. and Pace Institute, and is a past president of the Garden State Chapter of the National Machine Accountants Association.

JAY C. MacKAY *("Centralized Computer")* began his data processing career at Nationwide Insurance Company in 1947. Since then he has served in various capacities, including Supervisor of the Statistics, Planning, Procedures and Controls Section. He is presently the Supervisor of the Integrated Data Processing Section.

JACK W. SCHREY *("650 Evaluation for Production Control")*, Comptroller at the Magnavox Company, Fort Wayne, Indiana, is responsible for management reporting for the Radio-TV Division and Government Industrial Products Division. His experience includes many years in the field of systems and procedures and machine accounting.

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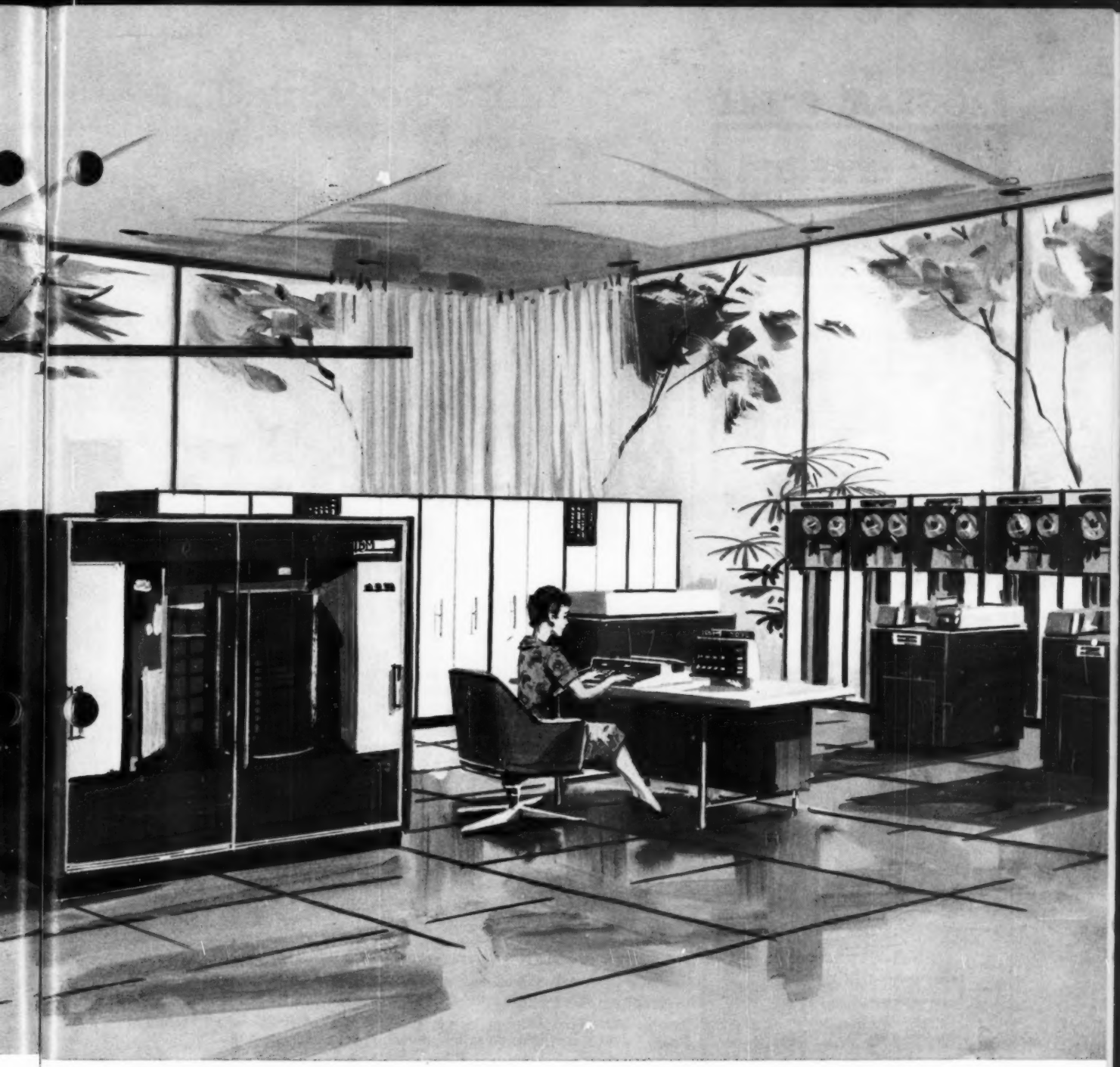

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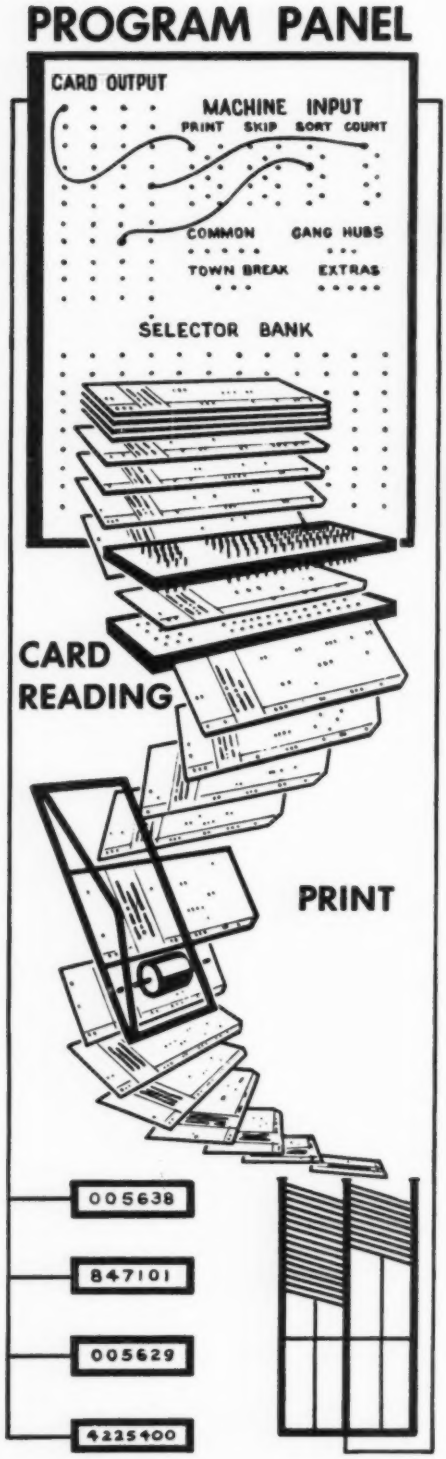

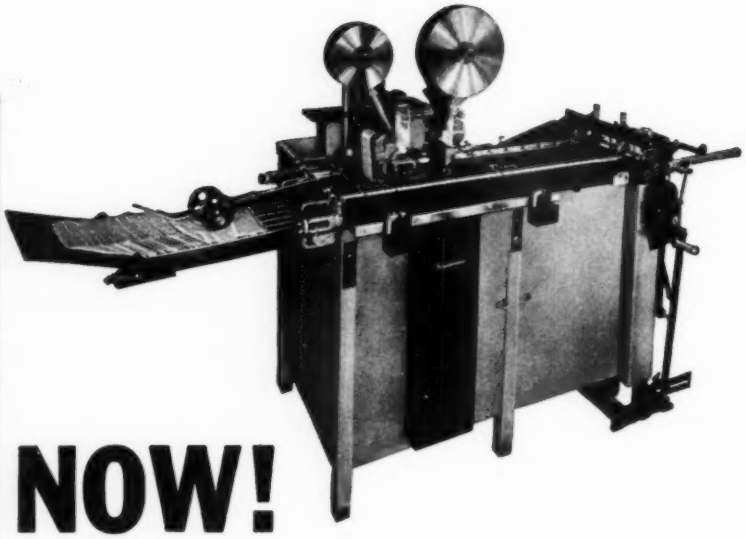

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Data Processing FORUM

Question 1– In your opinion, what is the major obstacle to be overcome before installing a punched card or magnetic tape system?

**S. L. Nochese, Manager,
Electronics Research
and Application,
The Port of New York Authority**

THE "OBSTACLE(S)" problem will inevitably rear its ugly head whenever punched card and magnetic tape systems are considered as a processing tool. In answering this question, I would prefer to depart from the beaten path which 99 times out of 100 leads to obstacles such as cost of computer, payout period, management acceptance, reorganization required, training of personnel, etc.

In my opinion, the biggest stumbling block in the effective and economical day-to-day utilization of EDP systems is the cost and the loss of precious time necessary to convert the source material to the required media for entry into the system. This conversion, in most cases, is done at some point other than the point of origin through intermediate steps and equipment. It would seem, therefore, that overcoming the major obstacle which I shall label "MACHINE LANGUAGE DATA ORIGINATION AT SOURCE" will have to await further equipment development. The equipment should be capable of *economically* and *accurately* producing at *high speeds*, punched cards or magnetic tape as by-products of making original entries at the time a transaction takes place.

**John Kervin,
Director of Operations,
Reynolds & Company
New York, N. Y.**

THE GREATEST OBSTACLE to be overcome in installing a punched card or magnetic tape system is the natural resistance of men to accept change. This resistance is encountered particularly in effecting a transition from manual procedure to a mechanized operation. Those of us who have experienced such a transition can testify to the lip service cooperation that is rendered by the old guard who frequently, for fancied reasons, resent the intruders. In some instances automation is regarded as a threat to personal security, although history belies this theory and management expends considerable effort to reassure their employees of the continued need of their services. However, I have found that the desire to "leave well enough alone" and the reluctance of many people to climb out of their comfortable ruts present the greatest hazards to a new installation.

Unfortunately, this negative type of thinking is not limited to non-supervisory employees and can be found in practically all levels of management. The latter situation often results in unpleasantness and needless delay and is a far greater obstacle in the way of a successful installation than are any mechanical or procedural problems.

**C. B. Wilson,
Methods Director,
G. C. Murphy Company,
McKeesport, Pa.**

THE TIME-HONORED PROBLEM of "human resistance" is still the major obstacle to overcome before installing a punched card or magnetic tape system. We must never forget that we are dealing with people who possess individual differences and may not be sympathetic with new theories, particularly if they are referred to as being "automatic." Disagreement is usually due to insufficient information; failure to understand the aims and purposes of the new system; or lack of challenge to the individual. Regardless of how well-planned the system may be, people can either make the program work or make it fail. Therefore, both the program and those administering the program must be "sold" to the people who will be performing the detailed operation.

A company which has reached a point of seriously considering a punched card or tape system is vulnerable to well-developed systems. National associations of management and systems have prompted a tremendous amount of system education in the past 10 years. Busi-

ness magazines publish many invaluable articles on tried and proven systems. The healthy competition between equipment suppliers has compelled them to assist in developing good procedures. They will even loan trained systems personnel. No supplier can afford to have a new installation go "sour."

Procedure within itself is no assurance of successful performance. Regardless of the amount of authority vested in those responsible for the program, regardless of the amount of sound control and systems development, if cooperation by all personnel is lacking, the program cannot succeed.

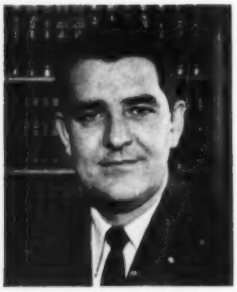
Good machine accounting procedures can always be developed and clearly stated in "black and white." However, the more difficult task is to use the right psychology of selling your people on the change. We cannot pressure anyone into accepting what is unpalatable or contrary to his thinking. There must be human understanding and good psychological approach when we communicate with our people. To ask our employees to help us with the physical handling of punched cards or tape is not a sufficient challenge. We must challenge their human portions, their intellect, their imagination and their personality. Let's sell with this type of challenge.

J. A. Commerford, Manager, Development Bureau, Consolidated Edison Company of New York, Inc.

THE MAJOR OBSTACLE to the installation of magnetic tape equipment is the management fear of the tremendous costs of conversion and installation without any guarantee of success. The reluctance to put all their eggs in one basket has also deterred many companies from installing this type of equipment.

In the case of punched card equipment, the major obstacle has been lack of initiative by management.

Question 2 - In your opinion, does automatic reading of handwritten data seem feasible within the next few years?



R. L. Harrell, Director Electronic Processing, The Reader's Digest, Pleasantville, New York

THE QUESTION "Does automatic reading of handwritten data seem feasible within the next few years" should be revised to read "Will research capital, necessary for the development of devices to read handwritten data, be made available within the next few years." Certainly automatic reading of handwritten characters is feasible. There are no secrets to the techniques required for reading and recognizing printed or handwritten data. The problem is purely economical. Both Intelligent Machines Research Corporation and Bell Laboratories have read "handwritten" data. The limitations of the character formation have been severely restricted to a point where reference to it as "handwriting" is an extreme liberty. For anyone to go further in this development, a justifiable application must be presented, and someone must pay the bill.

Automatic character reading and recognition economics will always depend on the quality and consistency of input and the nature of output requirements. If literal recognition is required then each character to be read must be distinctively "codeable." Each variation in character formation requires additional decoding circuits. If only generalized interpretation is required, the distinction between characters can be less restricted. The one consideration that will never change is that the more distinctive the characters to be read, the more practical will be the devices to read them.

John J. Koerner, Member of the Electronics Committee, Associated Hospitals of New York

JUDGING FROM the handwriting of the general public that we receive on documents, I doubt seriously that this kind of handwriting will ever be mechanically read. However, I see no reason why office personnel could not be trained to write in a block style which could be sensed and electronically converted to intelligent numbers. If a pattern which is recorded in block style by a machine, such as we now see on gasoline credit card imprinting, can be read automatically, then clerical personnel could be taught to write in a similar fashion.

It would seem to me, however, that initially the sensing of controlled block handwriting will be restricted to numbers only. This is due to the much simpler electronic wiring required to convert the pattern to a machineable code. Once this is accomplished, by adding more expensive circuitry to decode the pattern, alphabetic data could also be sensed. I believe that this kind of accomplishment will be available within the next few years.

■ ■ ■

RENTAL vs. PURCHASE

The factors influencing a decision to Rent or Buy data processing equipment are spelled out for management. A method of calculating rental and purchase costs, using one component as an example, is exhibited.

THE RENTAL VS. PURCHASE QUESTION is the usual follow-up for the company who has made the decision to switch to a computer system. With few exceptions, rental is believed more costly. However, for certain equipment, the only possibility is rental since either improved models may be anticipated or temporary use planned.

Rental with purchase option may be another alternative. The cost of purchasing after renting is more than that of initial purchasing because only part of the rental paid is credited towards the purchase price. Of course, if the option is not taken up within the specified time limit, an additional cost of continued rental is the loss of the option deposit.

First, let us consider the factors which influence the decision to rent or purchase, and second, the calculation of rental and purchase costs and the consequent savings, if any, of purchase over rental.

I. FACTORS ENTERING INTO THE "RENTAL vs. PURCHASE" DECISION

A. Obsolescence

Whenever the rental or purchase question is raised, the first and most obvious deterrent to purchase is obsolescence.

There are several factors which render equipment useless: the job for which it was intended is no longer needed and no other job can be substituted, wear and tear, and technological obsolescence.

With computer equipment, the first factor hardly applies since by its nature it is designed to be flexible. A computer installation is too expensive to be considered for purchase or rental if it were limited by specific applications. One of the justifications for its cost is the flexibility of the system and its adaptability to widely varying problems.

Any machine will eventually wear out from age. For computer equipment, this problem is not of immediate concern since it is estimated that it will take about fifteen years for the machines now available to wear out.

Of more immediate concern is technological obsolescence. This arises when a major or revolutionary change in machine principle makes it worthwhile to scrap previous equipment. In the computer field, such changes now in process are estimated to require seven to ten years to reach commercial production.

For the user, technological obsolescence does not necessarily mean that his current equipment is useless. He may find that the cost of conversion, installation

By W. E. Charlton

cost and running cost of a new system are more than the cost of continuing to use his present system.

When all things are considered, the problem of determining obsolescence is largely an individual matter. At present, in the computer field, the question will arise probably in seven to ten years. In the meantime, the anticipated date of possible obsolescence should be used as a guide for a depreciation schedule rather than as the determining factor in the decision to "rent or purchase."

B. Taxes

Taxes are roughly grouped into: those which directly apply to purchase price or rental, and those which indirectly affect purchase and rental.

1. **Taxes applying directly to purchase or rental:**
   - **a.** Federal Excise Tax. At present, this is not levied on computer equipment, but punched card equipment is taxed 6% when purchased and 10% when rented.
   - **b.** State and Local Sales and Use Taxes. These vary according to locale and may or may not be applied to both rentals and purchases.
2. **Taxes applying indirectly to purchase or rental:**
   These are the state and federal corporate income taxes. Since any savings of purchase over rental is considered the equivalent of net income, they are, in a sense, reduced by the amount of corporate income tax. Usually, for convenience in estimating, federal and state corporate income taxes are lumped together as one percentage.

For the most part, there is no advantage taxwise to renting before purchasing, because in all probability the portion of rental allowed against the purchase price is not considered deductible for corporate income taxes.

C. Depreciation

The initial step in setting up a depreciation schedule for equipment is estimating its expected life. For computer equipment, seven to ten years may be used, if anticipated technological obsolescence is the guide. However, fifteen years may be used if only wear and tear on the equipment is the criterion.

When considering depreciation in estimating purchase costs, it is better to use a conservative estimate of life expectancy, seven years. This figure is based on the tentative trade-in value table prepared by IBM for its computer equipment. The percentage allowance decreases to zero at the end of seven years. But more than likely, government regulations will stipulate a minimum of ten years for actual depreciation.

One of several methods may be used for spreading the purchase price over the years of anticipated equipment life. The reducing fraction method distributes the cost most heavily in the early years. The straight-line method spreads the cost evenly over the period. The output method is based on anticipated usage, and is not frequently used. It is best adapted to machinery in manufacturing where output is in easily measured units.

Since in calculating purchase costs for comparison with rental costs, one aims to compute actual cost, the reducing-fraction method is suggested. For this purpose, the IBM table of trade-in values is suggested as a guide but not as the final word.

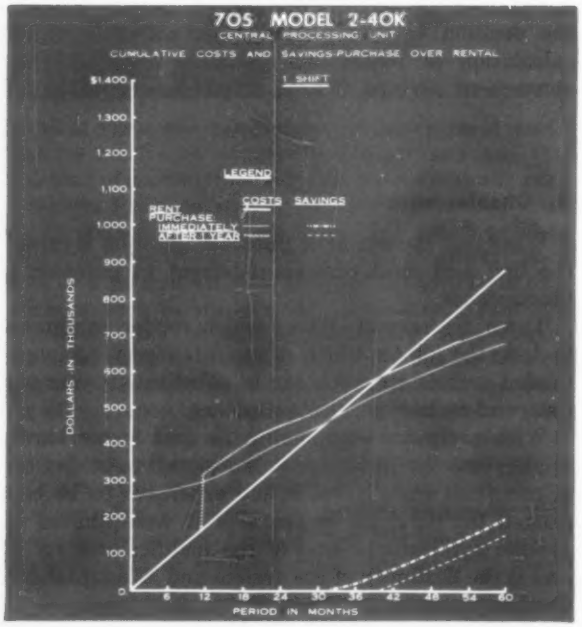
The straight-line method, the usual accounting procedure, spreads purchase cost evenly over the life of the machine. This method shows a savings of purchase over rental much earlier than the reducing-fraction method.

D. Interest Loss

When a company makes a major expenditure for equipment, the expenditure means a probable loss of interest on money available for investment. This would also apply in the case of rental.

For convenience in calculation, interest loss was not added to both rental and purchase costs, but instead the accumulated rental paid was subtracted from the purchase price and the interest on the balance was considered the interest loss if the equipment was purchased. The rental eventually accumulates to the point where it depletes the purchase price, and as operating time increases to two or three shifts, this process is accelerated. For example, for the 705 C.P.U. total accumulated rental equals purchase price in three and a half years for one shift operation; in two and a half years for two shifts; and in slightly over two years for three shifts, *see Fig. 1.*

Fig. 1—Accumulated savings and costs—5 day week 1 shift



E. Anticipated Usage

When any computer installation is planned, much thought must be given to the anticipated usage of the entire installation, and the auxiliary components. For some machines, the anticipation of an improved model will dictate rental. In the main, however, the decision to rent or purchase will be influenced by the amount of shift usage planned. For such an expensive installation, one shift operation is costly, and most certainly any company which plans to have a computer installation will not consider using it for only one shift beyond the first few months. As soon as two and three shifts are reached, even on a five-day week basis, it is more advantageous to purchase instead of rent.

Anticipated usage will be, of course, an even more important factor in the original decision of what components and how many of each should be included in the installation. This means striking a balance between providing for future expansion in jobs handled without being initially over-stocked with available unused time.

Planned two and three shift operation usually shows purchase as most advantageous.

F. Maintenance

Maintenance is included in rental but is an additional expenditure for purchased equipment. For a company which owns its computer installation, there is a choice between purchasing maintenance under a contract and doing its own maintenance. Initially, maintenance will probably be purchased. Doing one's own maintenance should be considered as a means of realizing additional savings.

For the purpose of estimating purchase costs for the rental vs. purchase evaluation, the cost of purchased maintenance may be used. These costs are stated and calculating additional usage costs is easy.

Maintenance can also serve as a guide to expected savings by comparing the monthly maintenance charge to the monthly rental charge. The higher the ratio of these two charges, the less the expected savings will be. In some cases, additional shift usage so increases maintenance costs that savings are not possible.

Although the high maintenance costs may indicate that some pieces of equipment should not be purchased, their close relationship to other components may dictate otherwise. For example, savings may be realized by purchasing the Card Reader and its Control Unit. Magnetic Tape Units have such a high maintenance charge that with a two and three shift usage there is no savings. If the Card Reader and its Control Unit are purchased, then the Tape Unit which must be used with it should also be purchased so that all the maintenance for a machine grouping will be on the same basis.

G. Purchase Option Contracts

Rental with option to purchase brings an additional factor into purchase costs. This additional cost increases the longer a company rents before purchasing. If the option is not exercised, then there is the penalty of losing the deposit.

Rental allowances vary from machine to machine, and the percentage allowed for a piece of equipment will reflect the amount of maintenance required for that model.

H. Savings

Having considered all the foregoing factors, the decision to rent or purchase will be based in the end on which, rental or purchase, will be the most economical. The savings to be realized by purchasing should be calculated separately for each kind of component. Thus it is easy to recalculate total installation savings when changes in plans are made regarding how many of each kind of machine will be needed.

Accumulated savings may be projected for the entire life expectancy of the equipment, or may be terminated at any convenient point in the life of the machine. (*This will vary depending on a company's customary procedure in calculating the savings of any proposed change.*)

Generally speaking, figures can be made to show what one wants them to show but when trying to estimate the possible savings of purchase over rental, the conservative, cautious approach is best.

II. CALCULATING RENTAL AND PURCHASE COSTS AND ESTIMATING SAVINGS

In arriving at total rental and purchase costs, in the examples which follow, any cost which is common to both is not added; for example, preparation of the location for the installation, air conditioning and power costs, and hauling and rigging charges.

A. Rental

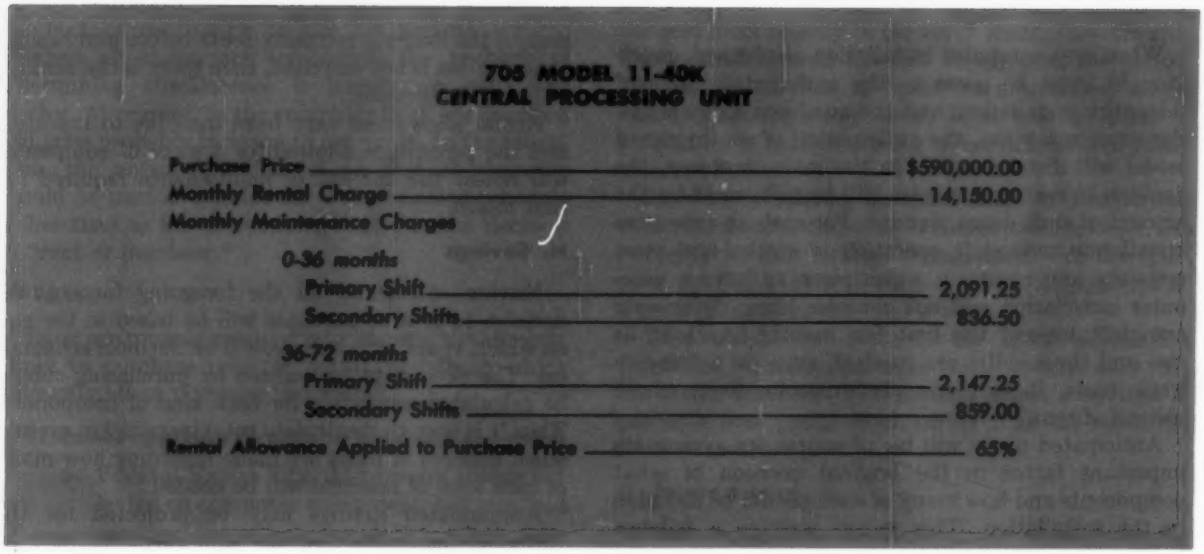
Under the IBM rental contract, charges are based on the number of hours scheduled per week. The base rental charged is stated on a monthly basis. Additional hours over and above the one shift of 45 hours a week are charged at the rate of 40% of the basic monthly charge. This overtime rental is easily computed in the formula:

$$\text{Additional Rental Charge} = M\left[\frac{(H_t - H_m - 45)\ (4.33)\ (40\%)}{176} + 1\right]$$

M = *Monthly rental for one shift, base rental*
H_t = *Total hours per week*
H_m = *Maintenance hours*

When the cost must be calculated for a number of pieces of equipment, it is convenient to figure separately the portion shown in brackets above and use it as a factor to be applied to the base rental charge.

In addition, any state or local taxes which apply to rental must be added to rental cost. *(Corporate income taxes do* not affect rental directly, and do not enter into the *calculation of rental cost.)*



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Purchase Price	$590,000.00
Monthly Rental Charge	14,150.00
Monthly Maintenance Charges	
0-36 months	
Primary Shift	2,091.25
Secondary Shifts	836.50
36-72 months	
Primary Shift	2,147.25
Secondary Shifts	859.00
Rental Allowance Applied to Purchase Price	65%

For ease in comparison, rental costs, in the example shown, were accumulated in six month intervals. *(Purchase costs were also figured at six month intervals because of the method used in calculating interest loss.)*

B. Purchase

The cost of operating purchased equipment includes depreciation, interest loss and maintenance. For purchase option contracts, there is the additional cost for any initial period of renting of that part of the rental paid which was not credited towards the purchase price.

1. **Depreciation of purchase price:** In the examples shown, this was accomplished by estimating the actual cost of the purchase to date as follows: purchase price plus tax minus trade-in value at the point considered equals actual cost, for example: the 705, C.P.U., at two years of machine life:

Purchase Price + Sales Tax	$607,700
Minus (48% of $590,000)	283,200
Cost	$324,500

2. **Maintenance:**

For computer equipment, monthly maintenance rates are usually different for primary and secondary shifts. In most cases the secondary rate is less; in others it is the same as the primary. Purchase of maintenance is calculated on the basis of the option chosen. The formula developed for use in the examples was based on Option B of the IBM maintenance control. It may be stated thus:

$$\text{Maint. Cost} = \text{Prim. Shift Rate} + \text{Sec. Shift Rate} \left[\frac{\text{(Tot. Hrs. Per Week - 40 Hrs.)} \ 110\%}{40 \text{ Hrs.}} \right]$$

The portion of the formula which is in brackets may be calculated separately and applied as a factor to the secondary shift rate for any piece of equipment to arrive at the additional usage maintenance cost.

For the first month of machine life, there is no primary shift maintenance charge. This will affect the calculation of maintenance for immediate purchase only.

For most equipment, the monthly maintenance rates go up with every three years of additional machine life.

3. **Interest Loss:**

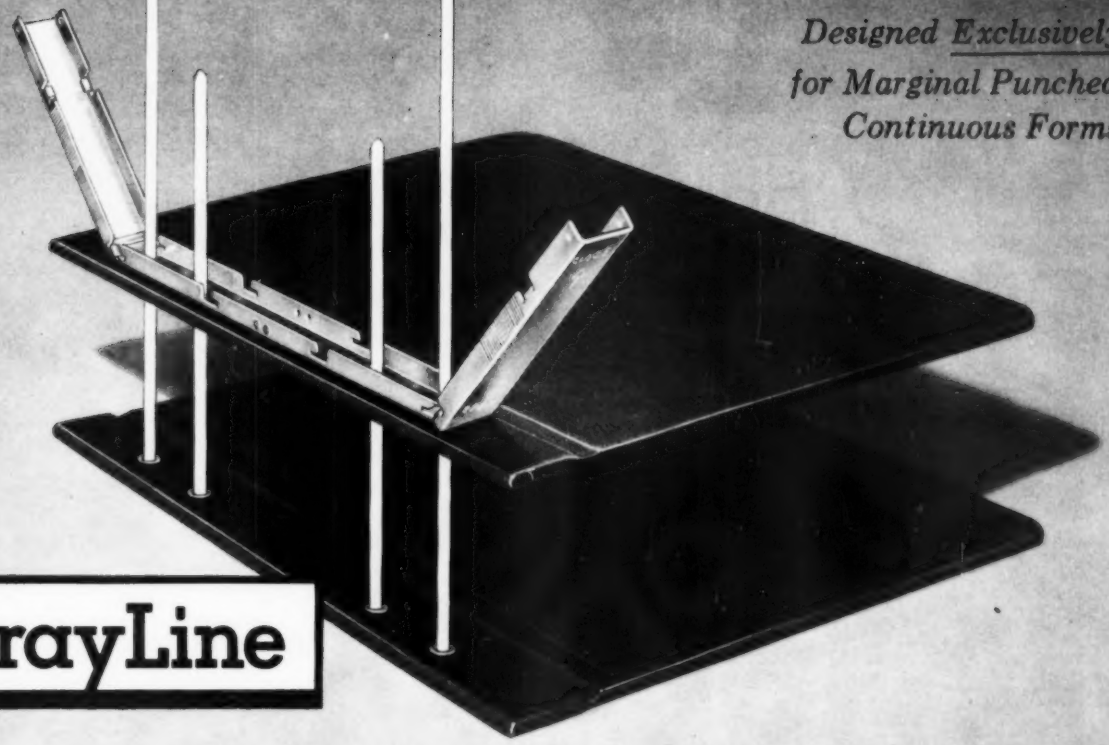
Interest loss was calculated at six month intervals at the rate of 2% *(i.e., 4% return for a year.)* This purchase price plus taxes was considered as equivalent to an investment. Said investment being reduced by rental, *(actually each month, but figured for six months at a time)*, the interest loss grows less until the entire amount is depleted. This interest loss was accumulated. Interest loss will vary according to a company's estimate of the rate of return it can expect on investments.

4. **Rental Not Credited:**

For purchase option only, there is the additional cost of the part of the rental which was paid but not allowed towards purchase price. This may be added to purchase costs and carried along as the costs are accumulated, or it may be deducted from any savings of purchase over rental.

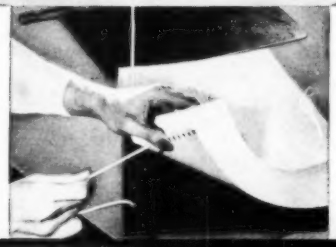
(continued on page 29)

Designed Exclusively for Marginal Punched Continuous Forms



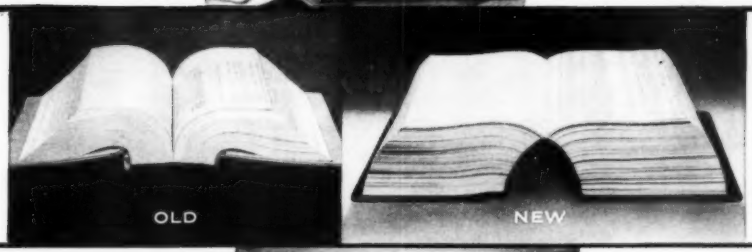
GrayLine

NYLON POST BINDERS



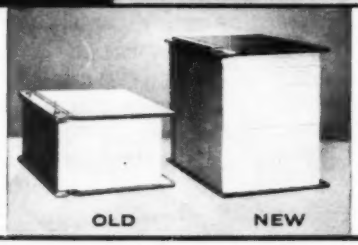
LOAD EASIER

No more rigid steel posts. Flexible Nylon bends for convenience and speed.



READ EASIER

Sheets lie flat. No hidden entries ... no wasted margins.



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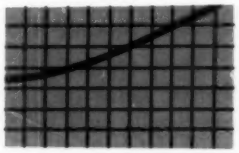
COVER FEATURE

The Role of Punched Cards in the Automatic Office

Editor's Comments— *Is the era of punched cards superseded by the advent of punched and magnetic tape, character-sensing electronic computers and other potential developments manufacturers may have in work? The answer to this question has great significance. Two authorities discuss both sides of this question.*

Punched Cards Are Here to Stay!



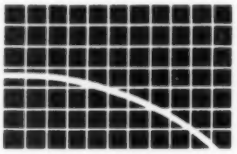
By Erwin Brenman

THE BIRTH of Electronic Data Processing Machines does not portend the death of Punched Card Equipment any more than the introduction of radio brought about the doom of the phonograph. The rejuvenation of the phonograph record was assured by the greater interest in high-fidelity sound reproduction made possible by the radio amplification systems, long-playing records and now by the introduction of stereophonic sound.

Similarly, the new Electronic Machines with their emphasis on the automatic office will bring about a renewed interest in punched card systems by many of today's non-users. Already, existing tabulating machines are being equipped with electronic relays, transistor and other electronic features so that the term EDPM covers Electric Accounting Machines (EAM) as well as the new high-speed computers. These improvements have made punched card machines more efficient than ever.

EDPM systems, by and large, utilize punched card equipment as auxiliary machines, especially through the use of keypunches and verifiers for input data. The new IBM 7070 Data Processing Machine has card input at 400 cards per minute as well as magnetic tapes. Its output may be cards punched at 250 cards per minute as well as magnetic tapes and direct on-line printers. Punched cards have several basic advantages over punched and magnetic tape, when used as input and even output. Basically, the punched card is an ideal common language medium readily comprehensible to both man and machine. It may be physically handled, sorted, corrected and manipulated. It frequently takes the form of a source document itself, or as output, becomes a record, meeting most legal requirements. The ease with which the punched card can be automatically converted into

Punched Cards Are Dying!



By Stanley C. Miller

PUNCHED CARDS ARE DYING! They were born way back around 1880 when Hollerith first used holes in paper for data processing purposes. They have served us well but they will soon be ready for a gold watch and a farewell dinner. And, as in many cases of retirement, they will be replaced by younger and newer ideas.

The punched card was the perfect machineable unit record. The need for unit records will remain—as contrasted to continuous records they have many advantages: ease of sorting, file maintenance, information searching. But the punched card as we know it, a piece of cardboard with rectangular or circular holes, will soon be obsolete. There are many reasons for this.

Limited Storage Capacity

The most obvious disadvantage of the punched card is its limited storage capacity. At present this is eighty or ninety alphanumeric characters per card. The holes could be made smaller and more numerous but the limitations are obvious. It is possible that a material will be developed allowing for microscopic interstices which permit the passage of electricity. These would be heirs apparent, but not punched cards.

The most likely replacement of the punched card will be a magnetic card. In principle, one could simply glue pieces of magnetic tape onto a present day punched card. In practice they will be made from paper stock coated with a suitable magnetic material. The recording and reading process will be similar to that used with magnetic tape. The density with which characters can be stored on magnetic tape is increasing at a gratifying rate. Even at 100 characters per inch all of the information on a punched card can be recorded on a piece of magnetic tape smaller

Punched Cards Are Here to Stay! *continued*

tape and vice-versa makes it most likely to remain a popular means of communicating with the high-speed electronic computers.

Punched cards are an excellent permanent record. Unlike magnetic tape, information can usually be retrieved from a damaged document. Now and then a machine will mutilate a card pretty badly, but it can usually be put back together, and the data reconstructed and reproduced on another card.

Economics of the Job

The large computers on the market today require considerable planning and programming before even a relatively simple report can be produced in finished form. When this huge task is pro-rated over a high volume or extremely intricate job, this amount of overhead can be readily absorbed. However, for the smaller task, for the one-time report, or for the revision of an existing report, such as interchanging several columns and omitting others, it becomes readily apparent that the use of punched card equipment with plugboards is most economical and feasible.

Now, of course EDPM is here to stay. This lusty infant is growing fast and the newer models are being unveiled in rapid succession. It is perhaps significant that, to date, practically all large-scale computers have provision for punched cards either on or off line. In electronics, competition has blossomed out so that IBM and Sperry-Rand are not alone in the field as they have been in tabulating cards. However, while both are pushing as rapidly as possible in the Electronic Computer arena, they are not neglecting the punched card business. Many types of punched card output machines in the form of bookkeeping machines and typewriters are being developed as part of the integrated data processing concept. Typewriter punches, adding keypunches, and bookkeeping machines used in conjunction with keypunches and various other combinations are already on the market. These alone will insure the life of the punched card system for many years to come.

Threat of Magnetic Tape

However, let us look a little more closely at the threat to punched cards offered by magnetic tapes. Why are they a threat? One of the reasons appears to be speed. Here is where the economic consideration is decisive. High speed on short runs is costly. High speed on long runs may result in an actual saving. Electronic Data Processing Systems are being installed because the high speed can be maintained, over what would have been a long run in the original system.

Punched card machines are now being built to counter this threat in the marginal cases. Sorters now operate at 1,000 cards per minute. The new collator, the IBM 088, operates at 650 cards per minute each feed. The new IBM 108 Card Proving Machine sorts cards at the rate of 1,000 cards a minute and simultaneously accumulates amounts up to eight digits, printing or summary punching up to six separate eight-position totals.

At the other end of the marginal user market is the new IBM Series 50. Here are slower machines at lower prices to entice the small businesses. After all, speed is relative to the volume of work to be performed. A basic punched card installation consisting of a keypunch, a sorter, a tabulator, and a reproducing summary punch can be acquired at an annual rental of about $4,500, the salary of one employee. At this price, many small concerns will begin to study their operations to see whether they too can benefit from punched card operations. A host of new installations seems to be indicated.

Market Among Non-Users

There are perhaps 30,000 companies using punched cards; there are probably 100,000 companies which eventually will be able to use punched cards. The market for electronic computers is to be found in the companies now using punched cards but the market for punched card equipment is to be found among the non-users. The use of punched cards is obviously going to expand. Lumber companies may have cleverly automated means for cutting wood; some do-it-yourself fans have power saws in their basements. But the average homeowner who wants to cut a piece of wood uses a hand saw. As technological advances continue in the fields of both punched cards and computers it merely means that more and more companies will find it economically feasible to install punched card equipment.

It is important to note the inventiveness and industry of the technicians in our punched card installations. The wiring ingenuity and capacity for improvisation which the tabulating personnel and methods engineers have shown is reassuring. And every new application means a wider possibility for the use of punched cards.

Pre-punched card bills with remittance stubs, clever multi-part forms designed to reduce extra reports, dual feed carriage operations for check-writing, invoices and similar forms—all continue to make punched card operations economical and desirable.

At present it appears that EDPM is for the larger concern. Planning, installing and operational costs are high and are likely to remain relatively high. Punched card installations will remain as adjuncts or auxiliary installations. For the medium-sized or smaller concern there is no doubt that punched cards will offer the greatest inducement. In the last ten years the advances in the punched card field have been phenomenal. The next ten years will continue this advance. Improvements in machine speeds, in character-sensing equipment for automatic keypunching, in machine capacities and operations, will continue to prove punched cards are here to stay. ■

than a 4c stamp. Area for area, a magnetic card could supplant several hundred punched cards. However, limitations imposed by the design of the reading and writing heads will probably mean that in the immediate future a magnetic card on the market will hold the same information as perhaps thirty or forty punched cards. Even that will be a considerable increase in efficiency.

Progress is being made in the storing of information on photographic film. Coding is accomplished by means of exposed and unexposed areas in the photographic emulsion; the information can be ready by means of a photo-electric reader. The possible information storage would be considerably greater than that attainable on a punched card. Photographic film would be used for permanent storage since, unlike magnetic tape, the information would not be erasable; this along with the fact that the information is "visible," might appeal to the legal mind.

Bulk Is Disadvantage

The low information density on punched cards means that they are bulky. A standard 20-drawer steel file holds about 70,000 cards, and this means more than 5,000,000 characters. The same amount of information can be contained on a ten-inch reel of magnetic tape. Even outside the high rent district very few companies have a superfluity of floor space. An inventory of blank cards must also be maintained —a role of tape can replace a half-dozen card cartons. Anyone who has carried both card cartons and tape reels can attest to the difference in weight; this is important in shipping costs.

The main disadvantage of the low density, coupled with the slow reading speeds, is that punched cards are highly inadequate as a means of communication with electronic computers. Even at a reading rate of 500 cards per minute—there are 1,000 cards per minute sorters but they do not communicate directly with computers—information is being read at a rate of only 40,000 characters per minute. Compare this with presently available magnetic tape speeds of 40,000 characters per second. Card reading speeds will increase—but so will tape reading speeds.

The standardization in shape and size of punched cards, and the fact that the holes can obliterate printed information, severely limits their use as business forms. Development work is being done on the use of fluorescent dyes which would be invisible and which could be applied to any business form. Under ultraviolet excitation the coding could be read with a photoelectric reader.

Relative Intelligibility Compared

Information can also be printed on business forms, using magnetic ink, which would be capable of being read by human as well as electronic eyes. Holes in punched cards are visible, but not readily intelligible. This is a great disadvantage in the use of punched card documents. It is one reason that banks, with their considerable need for methods of automatic processing checks, have given such an impetus to the development of character recognition. Another reason is that cards cannot be readily folded—and are readily damaged. With magnetic ink, on the other hand, a variety of paper check sizes and formats could be used together with some sort of standardization in the placement of the coding, some definite distance, say, from the lower right hand corner.

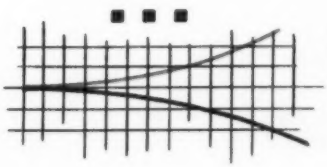
Character recognition usually refers to the ability of a machine to distinguish between various characters such as 3, B, 7, all of which, however, have a definite form—that is, a particular typeset—with rigidly prescribed specifications. Pattern recognition is the ability to recognize characters by their shape; the ability to recognize a "3" irrespective of the printing type. While still in its infancy, there is little doubt that someday it will reach maturity. This will mean the ability for machines to read business forms, both typeset permanent information and typewritten variable information. But long before that time punched card documents will be as rare as celluloid collars.

Forecast for the Future

Gazing a little further into the future one sees the disappearance of all documents. Paperwork is always on the increase and records accumulate—but the universe is finite. If punched cards were to continue as our sole storage medium the first structure on the moon would have to be used for 20-drawer files. Instead, we can look forward to the time when the housewife phones her order to the grocery store, an electronic brain automatically monitors the selection and packaging of the items required, charge is automatically deducted from the housewife's bank account and debited to the grocery store's bank account, and so on and so on—and no paperwork!

Punched cards have been most useful as a unit record; they have been less satisfactory as a common language. The competition from paper tape will hasten their demise. Punched paper tape, and eventually magnetic tape, plays the lead role in the IDP story. It can communicate with the greatest variety of present day business machines. Moreover, techniques for handling information on paper tape are constantly being improved.

I have a great admiration for punched cards—I have been using them for many years—and I will certainly view their passing with sadness. They, not computers, initiated the era of automatic data processing. But punched cards are on their way out.



COST CONTROL

JOB COST ESTIMATING– DATA PROCESSING JOBS

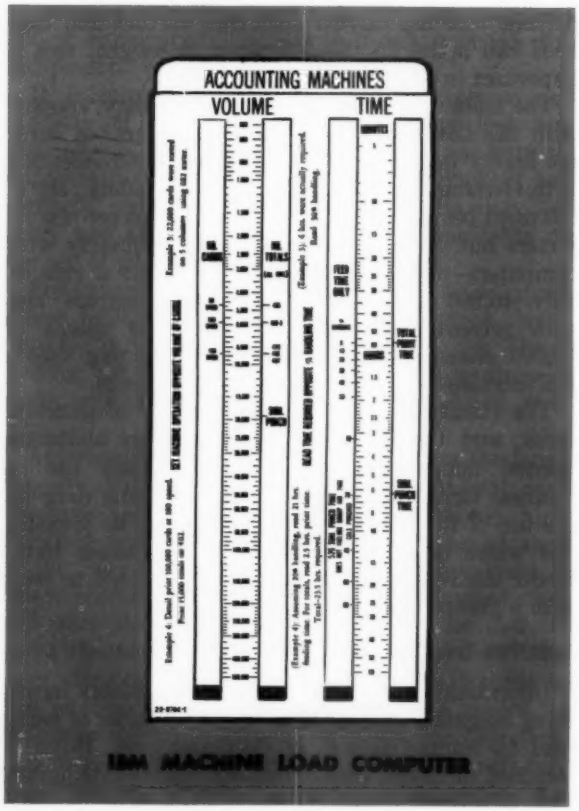
This is the first in a series of articles by Mr. Mitchell on Cost Estimating.

AN INTERESTING PARADOX of the business world is the fact that a specialist's greatest weakness is frequently his own specialty. Thus, the cobbler's kids go barefoot; the efficiency expert's desk is the most cluttered in the office; and the data processing manager, whose function is to assemble the data which give his company the costs of its factory operations, frequently has only a vague and inaccurate idea of his own costs. This, of course, is not always the case. When it is, however, it is a situation which management should not tolerate. Accurate cost data in the automatic office not only provides the basis for important decisions, but also acts as an incentive towards cost reduction; a means of applying sanction directed at cost reduction; and an effective way of evaluating operator personnel.

Obviously, the first step in estimating the cost of a job is to estimate the machine and operator time required for each step of that job. It is not the purpose of this article to discuss machine time estimating as such; however a few sources of information on this subject are mentioned below.

One place to look is, of course, the machine manual. Normally the manual for a punched card or electronic computing machine will provide detailed information as to its operating speeds under various conditions. Another good source of information is the various other literature available from the manufacturer. Two such booklets published by IBM are "Work Loads" (*Form 22-8295-1*), and "Scheduling" (*22-3430-5*); others are available from IBM and other manufacturers. Much of the information available from these sources has been summarized in slide rule form on the IBM Machine Load Computer (*Form 20-8704-1*), which can be a handy gadget.

By Jack Mitchell



IBM MACHINE LOAD COMPUTER

Another valuable source of information and assistance is the salesman or systems specialist representing the manufacturer of the equipment you use. Most of these men are well-informed and usually of sufficient integrity to be of considerable assistance. Naturally, you shouldn't take his word as gospel, nor should you expect him to do your work for you. However, if you request his assistance, you will usually find that it is available and competent.

Probably the best source of reliable information on time estimating is your own past performance records. Only these records can tell you how long it will take to punch a given card from a given source document; what is a reasonable handling time allowance for a particular job; etc. Such records have been criticized as a source of cost estimating data in that they represent what has happened, rather than what can and should happen. This argument is not necessarily valid. If you are trying to estimate costs, you should be interested in facts rather than in ideal situations. Perhaps the setting of performance standards can be done deductively, but for estimating costs the inductive approach is far more realistic.

Defining "Cost"

It might seem that, before wrestling with a cost estimate, we should first define the word "cost." Not only does "cost" mean different things to different persons, but even to the same person it means different things at different times. To illustrate: How would you estimate the cost of this job?

To simplify the problem, let's work on only one factor of cost: machine rental. Here is the data—you may use all or any part of it.

The job will take ten hours of a machine which rents for $600 per month. No safety factor is needed. There are 150 working hours in the month. The job will be scheduled at a time when the machine is not needed for any other purpose. The installation has just one such machine, and the machine utilization records show that this particular machine is now being used 80% of the time.

Here are *four* possible answers, any one of which could be considered correct.

1. $600 rental divided by 150 hours availability gives cost of $4.00 per hour. $4.00 multiplied by 10 hours gives total cost of $40.00.
2. $600 rental divided by 120 hours utilization gives hourly cost of $5.00; total cost of $50.00.
3. 120 hours present utilization plus an additional 10 hours if we decide to do this job gives 130 hours proposed utilization. $600 rental divided by 130 hours proposed utilization gives an hourly cost of $4.61, or a total cost of $46.10.
4. The machine is available; if we don't do this job it will just sit there idle. Therefore our total cost is zero. (*This is the 'out-of-pocket' concept, about which more will be said later.*)

The interesting thing about this example is that we have found at least four acceptable answers, and all we were trying to determine was one simple element of cost. Were we to throw in all the other complications which are to be found in costing a lengthy, realistic procedure, we could probably come up with a thousand acceptable answers.

It is for this reason that this simple piece of advice is offered—never, *never*, use the unqualified word "cost," unless you are absolutely certain that anyone who hears or reads it will know exactly what you mean. Instead, label your cost.

Consistency in Costing

When a cost estimate is made, it is usually for one of two purposes: either to compare costs of the present method with those of the proposed (*punched card*) method; or to see if a given result (*i.e., a report, statistical data, etc.*) is worth the expenditure. Actually, the purpose is usually a combination of these. In any case, a decision will usually be based on the cost estimate. Sometimes you will make the decision; sometimes your subordinate, your superior or a staff man will. In any case, it is essential that the person making the decision know exactly how the estimate was derived; it is desirable that all others concerned know this too.

To achieve this ideal, two steps are recommended. The first is that, whatever the purpose of a cost estimate, the estimate should be made in a consistent manner. This manner should not only be used consistently in the data processing department, but throughout the country. Of what value would an estimate of the cost of doing the job by punched cards be, when that estimate included the cost of all cards and forms, adequate allowances for all overhead factors, etc., if it is to be compared with another department's estimate which included only direct labor cost?

Consistency has another benefit. Two years from now you may have to pull today's estimate out of the file to discuss it with your boss. When this occurs, you don't want to have to spend hours pouring over the details of the estimate to find out exactly what it includes. If you prepare all of your estimates in a consistent manner, you will know immediately just what is included.

Labeling Costs

The second step towards permitting the decision maker to know exactly on what he is basing his decision is labeling your cost. One technique for doing this is by using a large rubber stamp, which clearly states what is included and what is not included, and which is placed on every copy of the cost estimate. Thus, no matter who gets a copy of the estimate, no matter how he gets it, he will be able to interpret it properly. An example of such a rubber stamp reads as follows:

This estimate includes the following costs:

Direct labor, weighted for idle time;
Direct machine rental, weighted for idle time;
Direct material cost; and
Departmental overhead, including only supervisory salaries, clerical salaries, and indirect material. It does not include general and administrative overhead, heat, light power, floor space, or material handling overhead.

This is one method of emphasizing effectively exactly what your estimate does or does not include. Another possible approach is to list on the top (*or summary*) sheet of the estimate just what is included, showing the figure for each element listed. This, however, does not emphasize what was *not* included, and this is frequently even more important.

If, for some reason, you wish to determine costs in a different way, without violating consistency, you might first prepare an estimate in the standard manner; then, using this as your source of information, prepare an additional sheet, extracting what is wanted. Be sure to label this additional sheet very clearly.

There is one further point on labeling your costs. It's all well and good to know how to qualify your estimate with a rubber stamp, footnotes, etc. However, there will come times in a meeting, on the phone, or in correspondence when it would be inappropriate for you to launch into a long explanation. When this occurs, you need a terse phrase which will imply most of what goes on the rubber stamp. Now, there are many such terse phrases. Most of them started off with a very specific meaning, but have since picked up several others, so that there is no one way of being sure that you get your exact meaning across. However, for the type of cost described in the rubber stamp illustrated above, either "loaded department cost" or (*less desirable*) "total department cost" might be used. *Never* say "fully loaded cost" or "total cost" unless you are including all factors up to an appropriate portion of the chairman of the board's salary. The term "out-of-pocket" is self explanatory, and one of the best ones to describe this type of cost. Incidentally, don't resent it if someone interrupts you to inquire just what you mean when you say "loaded department cost"; he is actually doing you a favor by giving you an opportunity to tell him the whole story.

Out-of-Pocket Costs

Out-of-pocket costs are those costs which are directly attributable to the change being costed, and which would not be incurred if the change were not made. At first glance, it might seem that these are the costs in which we are really interested. In addition, they are always the easiest costs to estimate accurately. However, a word of caution. The habit of making out-of-pocket cost estimates is one of the most dangerous traps you can fall into. Once you start using this technique you will find the tab room performing so many uneconomical jobs that you have to go out and order more equipment and hire more personnel.

This is not to say that out-of-pocket costing should never be used; only that it should be used rarely; that it should be used with extreme care; and that everyone involved should realize exactly on what the decision is based. One company which very properly decided to prepare its payroll on punched cards did so even though they knew that the loaded costs were much higher than those of the manual methods previously in use. But this company paid all of its employees on a semi-monthly basis; the preparation of the payroll was a task which the data processing department could perform at its least busy time. The overall effect was a saving to the company.

In conclusion, an added word of warning. If a data processing manager does not figure his overhead into the cost of each job, he will be tempted to mechanize uneconomical jobs. Pretty soon he will need another assistant, another secretary, another methods man or another raise. The plain fact is that total overhead actually does increase with each added job, even though the increase might in each instance be imperceptible. Looking into these indirect costs will be the subject of the next article in the series.

■ ■ ■

Part Two of this series on Cost Estimating—DISTRIBUTION OF INDIRECT COSTS—will be published in the next issue of MACHINE ACCOUNTING and DATA PROCESSING.

COMPUTER OBSOLESCENCE UNLIKELY

"Present electronic data processing computers won't become obsolescent," says James R. Bradburn, a vice president of Burroughs Corporation. "Many prospective users delay computer installation because of obsolescence worries, needlessly sacrificing the financial gain which outright purchase of a computer system offers, leasing instead," he said. "A computer is truly obsoleted by newer equipment only when the full price of the new model can be absorbed in reasonable time by savings realized over its predecessor," concluded Mr. Bradburn.

COMPUTER SPEEDS CAA's WORK

Modernized air traffic control, courtesy of the IBM 650 Ramac, is in operation at the Civil Aeronautics Administration's Center in Indianapolis. The machine is being used to compute and print flight progress data, estimate flight arrival times over check points and determine air-space conflicts in flight plans. By automatically performing these tasks, it enables the CAA air traffic controllers to devote greater attention to their decision-making responsibilities for air traffic safety.

SPECIAL PURPOSE EQUIPMENT

When this year's chrome on last year's model still doesn't solve the vexatious problem of your system, should you promote a piece of special equipment?

By Israel Diamond

PROMOTION is a subtle art—exacting, exasperating and rewarding; promoting special purpose equipment is no exception. The equipment may be conceived abstractly by a coolly efficient supervisor, in desperation by a harassed employee or with an eye to the budget by an imaginative executive. However, it sees its first light, and however long it takes to convince your firm or a manufacturer of its practicality, the chances are that if you are successful you will have something special only in the sense that there is no such thing presently on the market—and you will be the first to own it.

I am not using the term special purpose equipment in the sense in which it contrasts with general purpose equipment. One of the main difficulties of convincing a manufacturer to build a not-so-special piece of equipment for your special needs is persuading him that it has enough general applicability to be marketable to others. Otherwise, a manufacturer will hardly incur the necessary development costs. Most manufacturers in the data processing field do have their own active product development groups. New equipment, new techniques and new designs are constantly arriving on the scene. To some users, however, these may be only more chrome on the bumper of last year's model. Finding himself unable to improve upon some time-consuming and costly procedure with the aid of any presently existing hardware, he turns to the thought of having something designed specifically for his need.

Selling the Manufacturer

Suppose then that you have thought of an excellent method of improving your present procedure and you seek a manufacturer who will build the necessary equipment for you. This first step, selling a manufacturer on the idea of developing the equipment for you, may be the most difficult one. Engineering research and development can be costly—it can run into hundreds of thousands of dollars. The assumption is that your company will not itself bear two hundred thousand dollars development costs to replace a piece of equipment that is renting for two hundred dollars a month, even if it does mean increased efficiency. A manufacturer will therefore have to feel assured that once the prototype is successfully in operation he will be able to mass produce it at a cost which will have an adequate market.

This means that the special piece of hardware you need cannot be too special. In most cases, there will be other organizations facing problems similar to your own, and just as you purchase a six-passenger car even though you may ride alone in it most of the time, you won't want a piece of equipment so specialized that it cannot meet your own changing needs.

You will probably find that a medium-size manufacturing company is your best chance. The giants in the field seem at times amazingly uninterested in the needs of a particular user. Small companies, on the other hand, will probably not be able to invest the necessary time and funds in the development work. Even the medium-size company, once started on the project, may occasionally find it necessary to postpone the job while some more urgent and presently successful piece of equipment demands full attention.

Mr. Israel Diamond, the author, and operator are shown with one of the specially designed punched tape machines at Broadcast Music Incorporated. It is mounted on a table directly under a rotary file containing master key cards which, when inserted in the sensing mechanism, transfer the master information into holes in a paper tape. Variable information is entered from the keyboard.

Much is written about the need for a "common language" in data processing. You will find a similar need when your discussions begin with the engineers. They will not likely be acquainted with your terminology—cross-foot, gang punch, tub file—nor will you likely be conversant in the world of engineering—mils, diodes, ohms. But it will be an enriching experience. Your ideas will slowly merge, and the prototype will finally be built.

One of the problems you will encounter is the unfortunate limited conformity in present day media, such as punched card, paper tape or magnetic tape. The special equipment being built will be only one part of the overall system and will probably be linked to more conventional equipment. This will require particular care in your systems design.

BMI's Experience

Properly designed, special equipment can be very valuable. At BMI we recently installed a new type of input machine. This was developed with Ernst & Ernst, a consulting firm, and engineered and built by Taller & Cooper, Inc. A brief description of this equipment will illustrate some of the ideas we have expressed.

BMI is a national music licensing organization. We tabulate public performances of licensed music and compute and make payments to copyright owners. One step in the data processing procedure is the preparation of a punched card for each performance of a BMI licensed composition. Prior to the introduction of the special equipment, pre-punched detail cards were kept in large tub files. These detail cards were prepared in batches from master cards, with one master card for every BMI licensed composition. As reports of usage were received the detail cards were extracted by hand from the tub files. They were subsequently processed on conventional punched card tabulating equipment.

The special equipment was designed to eliminate the tub file. This equipment can be described as a punched-tape machine. The machine, about the size of a desk comptometer or an adding machine, is mounted on a table directly under a rotary file. The file contains master key cards—special long lasting small cards, not conventional punched cards—which, when inserted in the sensing mechanism, transfer the master information into holes in a paper tape. There is also a keyboard from which variable information is entered. The paper tape is processed through a tape to card converter and the resulting punched cards processed as before. The procedure is very successful and can be extended to a variety of applications.

Cost Comparison Is Determined Internally

Each company must determine its *own* yardstick for measuring performance. Unless there is some measurably common basis for comparing the old system and the new it is impossible to make cost comparisons. Some sort of cost comparisons are of course necessary at the very outset as part of the original feasibility study. In our own case the yardstick is a rather simple one; the number of detail cards produced *without error* by a single operator. Compared to the tub file approach, productivity per operator has doubled.

A complete cost comparison must take into account many factors. For instance, we have been able to save costly floor space by eliminating the extensive tub files. We have also been able to decrease greatly our inventory of punched cards. Without going into all the considerations that apply, I wish merely to emphasize that questions of cost will be different for various companies and various applications and can be determined only internally.

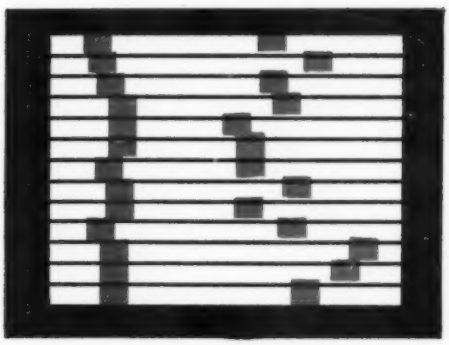
After the prototype equipment has been built there will follow a considerable period of testing and debugging. This debugging does not necessarily finish with the installation of the equipment. In our own case we found that equipment that had been working perfectly at the factory insisted upon exhibiting frequent intermittent errors when used under operating conditions. The manufacturer's engineers would take over the equipment after the close of business hours and check it out thoroughly. It would work fine. The next day the intermittent errors would be back. Eventually, it was discovered that the air conditioning unit which was on during the day, but not evenings when the engineers were testing the equipment, so heavily drained the current on the lines that the voltage to the special equipment was below the tolerance level.

There will also be trials and errors in the development of the auxiliary fixtures that may be needed. For example, it was necessary to decide on the proper work table height, and on the proper length reach to the file of master cards. A design arrived at with the aid of a demurely proportioned young miss had to be changed when the actual operators used turned out to be more stately. While all difficulties eventually get cleared up, eventually can be a long time. Troubles are the rule, not the exception.

Personnel questions associated with the introduction of special equipment are similar to those encountered whenever new equipment or new systems are introduced. With special equipment, of course, there are no experienced supervisors to be obtained, nor are there company training schools for your personnel. In BMI's case, the conversion was completely successful. Dual systems were kept in operation for about two months, in separate locations. Over one weekend the tub files were removed and the new equipment took over.

The creation of special purpose equipment is gratifying. Jumping the gun means profits and prestige. To succeed you must not only have talent as an entrepreneur, but also throughout the development period, patience is a prime necessity. And begin with your most optimistic conservative time estimate—then double it. ■

SCHEDULING in the Data Processing Department



Considerable research in scheduling has not found a replacement for the heart of the matter — a good supervisor.

SCHEDULING is a problem common to nearly all data processing departments. One day half of your machines may be idle—the next day you are working overtime. Perfect scheduling is non-existent; good scheduling is difficult enough. There do exist installations which perform only one or two applications day in and day out on a continuing basis. But the average department—having daily reports, monthly reports, annual reports, special reports—must accept the fact of non-level production. And even the best staffed department has an occasional re-run.

The objective of scheduling is the achievement of the best utilization of men and machines consistent with the particular pattern of reports that have to be produced. Machine utilization is specific to your own department and it is usually worthless, and sometimes dangerous, to make comparisons with others. Most departments find that at least occasionally, if not often, they must run on overtime. Most data processing supervisors, no matter what their utilization figures show, judge their performance on how well they can hold overtime to a minimum. The best reason for keeping records is that one can compare present performance with past performance.

There is today no method whereby an electronic computer can do your scheduling for you. Production planning and control is a very important aspect of all manufacturing operations. A data processing supervisor in a manufacturing company will find that he has much in common with the production control people. While the reports being turned out are usually of an accounting nature, and the data processing department is usually placed organizationally within the financial part of the company, the basic operation is that of manufacturing a product—in this case the product is a report.

Considerable research is being done by mathematicians and engineers on the problem of finding rules for good scheduling. So far the systems studied have been very simple ones. There seems to be nothing that can simplify the scheduling job of the data processing supervisor. His task is difficult mainly because he manufactures small quantities of a variety of products. In addition, when we consider special reports, varying lengths for the routine reports,

By Jack Perlstein

occasional machine breakdown, and a variety of personnel considerations, the only solution seems to be a combination of common sense with experience.

There are, however, certain systematic ways of proceeding. There are also various charts, tables, etc., that offer help. We have devised one simple effective aid to scheduling. It is only an aid—the heart of our scheduling operation is an excellent supervisor.

Schering Corporation is a manufacturer of pharmaceutical specialties. The tabulating department is responsible for preparing a great variety of reports. Applications include billing, payroll analysis of domestic and foreign sales, actual expenses and budget variances, cost accounting, production and inventory control, maintenance reporting, property accounting, clinical research data on new products and various internal accounting reports.

The company has grown rapidly over the years, with corresponding growth in the variety and quantity of reports. This is a rather common cause for scheduling problems. In addition to new applications and increased volume of present reports, we recently went from a ten day closing to a six day closing for our financial reporting.

The first step in effective scheduling is obtaining the cooperation of the various departments from which data are obtained. Unless the input can be properly scheduled, and is consistently received on schedule, it is impossible to turn out reports on time. We received excellent cooperation. This step must be accomplished even if it requires top management intervention to do so.

We are fortunate that our reporting is done on working days, not calendar days. Thus a report may be due on the third working day of the month. If the first of the month is on a Thursday that means the report is due on the following Monday. If Friday was a holiday then the report would not be due until the following Tuesday. This simplifies the scheduling operation and makes it independent of the number of actual calendar days in the month, or the occurrence of a holiday.

We also report by plant week. If a month has twenty working days, then there are four plant weeks, each of five days. If there are twenty-one working days in the month, then the number of days in the plant week are 5-5-5-6, and so forth. A report will then be due, say, on the second day of the plant week.

Production scheduling on a working day and plant week basis is probably not uncommon in manufacturing organizations. I do not believe it is as common in non-manufacturing organizations. There are certainly cases where it could simplify the scheduling problem of the data processing department. I have heard of reports that have to be out on the fifteenth day of the calendar month; if this falls on a Saturday then the report is due on ti. fourteenth, etc.

To assist in our scheduling we have prepared a large board—actually we use four of them—about 30 inches square. These are mounted on the wall. These boards are lined into rows and columns and small colored plastic strips can be slid back and forth in runners on the board. Such boards are in common use today in a variety of applications. The strips may be held in several ways: tracks, pegs, magnetically, etc. We use a board known as a visual schedule control board.

Each row is labeled, along the left hand side of the

board, with the name of a report. The variety of our reports necessitates the use of four boards. Next to the name of the report the due date, the number of copies and the frequency (*i.e. monthly, weekly, etc.*) are listed. The first two columns are headed at the top with the words "Open" and "Closed" and the remaining columns are numbered across the top with the working day of the month: 1, 2, 3, etc.

Let us consider only the monthly reports, although the other reports are handled in the same manner. At the first of the month a blue strip for each report is moved into the column marked "Open." When a report is finished—and this means all processing has been completed and the report is ready for distribution—the blue strip is slid into the column marked "Closed." This gives an immediate visual presentation of how many reports have been completed, how many still have to be run.

On any working day that a report is due and has not been completed, a red strip is placed next to the blue strip in the "Open" column. When the report is finally completed both the red and blue strips are moved to the "Closed" position. Thus one can tell at a glance how many reports were finished late, and how many are late and still unfinished.

On the first of each month a green strip is placed, for each report, in the column for which that report is due. Thus if a report is due on the tenth working day, a green strip is placed in the column marked 10. A purple strip is moved each day across the top of the chart, and indicates the current working day. Thus at a glance one can compare the relative position of the purple strip and the various green strips and see which reports are due that day, which the next, and so forth.

After the completion of a report, a yellow strip is placed in the column for the actual working day on which the report was finished. If the report was finished on the day on which it was due, the yellow strip will be in the same column as the green strip described above. If the report was completed early the yellow strip will be in some column to the left of the green strip; if the report was completed late the yellow strip will be in some column to the right of the green strip. At the end of the month one can see which reports were finished on time, which ones early, and which ones late.

The visual schedule control boards serve two functions. First of all they allow the supervisor to tell at a glance the status of the various reports. Since many of the problems of scheduling are day-to-day ones—meeting the unexpected situations that arise—the board is an aid in the decisions that have to be made. The boards are mounted on a wall and are visible to all of the operators. This definitely makes all personnel due date conscious.

The second function served by the boards is a soul-searching one. At the end of each month, we can see which reports were late, which early. We can go back and try to find out why they were early or late. And we can try to improve our schedule.

Continuing improvement is the foundation of good scheduling. Original schedules were made out using volume-time charts, etc. As the months progress, the visually graphic charts afford us the opportunity to improve on the schedule. We are also in a position to revise due dates and schedule with changing types of reports and size of reports.

We shall certainly welcome the day when someone finds a way to wire a plug board for our IBM 602A so that it can do our scheduling for us. However, the results of our present system are very gratifying—so gratifying that while we schedule our jobs, we find it unnecessary to schedule particular machines or personnel in advance. ■

SAMPLE BASIS FOR CALCULATING YOUR SERVICE BUREAU BILLING

FUNCTION	CHARGE PER HOUR
KEY PUNCHING	$ 3.50
KEY VERIFYING	3.50
REPRODUCING	5.00
INTERPRETING	5.00
SORTING	5.00
COLLATING	4.50
402 TABULATOR	10.00
407 TABULATOR	16.00
SUMMARY PUNCHING	2.00
604 CALCULATING	18.00
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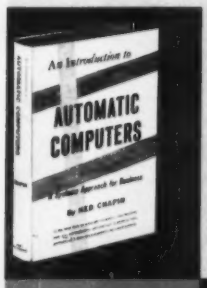

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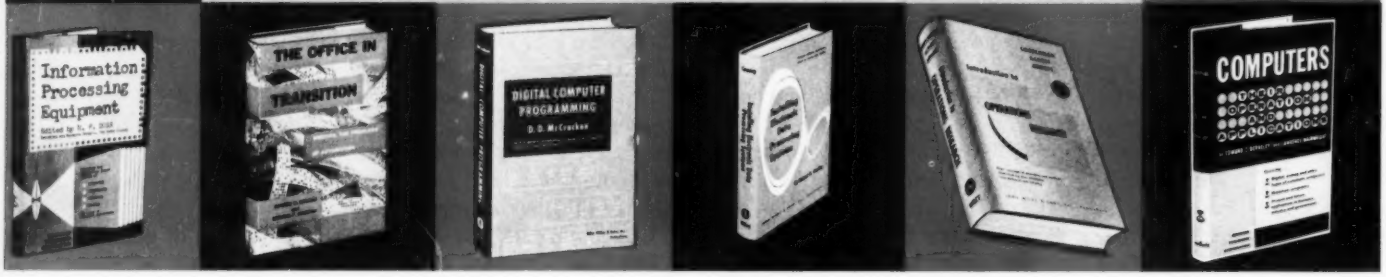

AN INTRODUCTION TO AUTOMATIC COMPUTERS, Ned Chapin, 544 pages, $6.75.

This noted authority fully answers the specific questions that are most important to business students. What is an automatic computer? What can it do? How does it function? How is it programmed and operated? How can the need for a computer be pinpointed and its use justified?

INFORMATION PROCESSING EQUIPMENT, M. P. Doss, 280 pages, $8.75.

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THE OFFICE IN TRANSITION, Esther R. Becker and Eugene F. Murphy, 190 pages, $4.00.

Based on the experiences of offices in which the transition to automation has been successful, this volume describes the human and technical problems that arise. Particular attention is given to the sociological aspects inherent with the introduction of automatic office techniques.

DIGITAL COMPUTER PROGRAMMING, D. D. McCracken, 253 pages, $7.75.

This new book accomplishes two important tasks for users and potential users of computers. It discusses the practical aspects in working with these machines and secondly, it gives a lucid picture of the fundamentals upon which this fast-growing field is built. A key feature is the mythical computer called TYDAC, devised by the author to illustrate principles and techniques.

INSTALLING DATA PROCESSING SYSTEMS, Richard G. Canning, 193 pages, $6.00.

This book takes a realistic approach in non-technical language. The author assumes the reader is relatively unacquainted with electronic computers and mathematics. It shows the wide variety of problems that can arise when installing an EDP system. It makes a special point of fitting EDP into overall management improvement.

INTRODUCTION TO OPERATIONS RESEARCH, Churchman, Ackoff, and Arnoff, 664 pages, $12.00.

This is the only available introductory text on Operations Research. It emphasizes the method of approaching research from a scientific viewpoint and stresses the importance of defining management problems in terms of objectives and of administration of O.R. Contains numerous lucid case examples.

COMPUTERS, THEIR OPERATION AND APPLICATION, Berkeley and Wainwright, 376 pages, $8.00.

Down to earth information on exactly how computers work and what they can do, including such important considerations as computer reliability, advantages, limitations and maintenance.

ELECTRONIC DATA PROCESSING FOR BUSINESS AND INDUSTRY, R. G. Canning, 322 pages, $7.00.

Answers the major questions in management's mind about the field of electronic data processing by discussing the application of digital data processing devices to business clerical functions. The reader does not need any previous knowledge in this field for the author writes for the layman. The company is studied as a united operation which works toward a goal set by management.

Transmitting renewal information from branch offices and processing on a... CENTRALIZED COMPUTER

A data transmitter, operating on telephone circuits, extends the arms and legs of the home office computer for an insurance company.

By Jay C. MacKay

TO INSTALL A COMPUTER in each of the regional offices of the Nationwide Insurance Company was not economical. Consequently, the need to convey punched cards and reports quickly to a centralized computer in the Home Office gave rise to the IBM Data Transceiver transmission technique. With the Home Office acting as a Service Center it was thus possible to extend the arms and legs of the computer.

The Transceiver was especially suitable for communicating with IBM 650 since it did not require data conversion. The first machines used were operated on 100 words per minute telegraph circuits, producing a maximum of 5 fully-punched cards, per minute. The experimental operation on the machines was checked against a parallel operation of mailing the cards and found extremely reliable. However, it was found that telephone circuits afforded even faster transmission speeds and more satisfactory communication between Home Office and field points.

The characteristics of telephone circuits upon which Data Transceivers operate are these:

1. *Extraneous noise on the circuit must be at a minimum otherwise many stops or incomplete cards will result.*
2. *Constant transmission levels must be maintained, otherwise signal fade will affect transmission efficiency.*
3. *Echo suppressors should be removed from long circuits and 1000 cycle ringers should be accurately regulated to prevent operation on tones employed by the Transceivers themselves.*

When circuits are not used for data transmission they are used for voice communication by transferring to the switchboard location. In this way, the cost of leasing the circuits is partially underwritten by placing calls which otherwise may have resulted in long distance toll charges. A telephone hand set at each machine station on the circuit enables the operators to communicate with each other regarding work problems and enables maintenance personnel to check maintenance problems.

Problems Encountered

The installation of Data Transceivers presents many problems: First, proper channel selectors and machine specifications at specified points when two machines are used are needed. Second, the circuit must be installed and tested, with all clearances required. Third, machines have to be hooked into the line and tested.

Operation of Data Transceivers

This machine provides a means of transmitting punched card information over wire lines, microwave and short wave radio circuits. Two machines, one

to send and one to receive, are required for transmission in either direction. Transmission is direct from card to card with no intermediate storage such as punched paper tape required. Checking circuits incorporated in the machine insure a high degree of accuracy in the transfer of data. The principle of "supervised reception" provides for the receiving machine to act as a control over the transmitter.

When operated on telegraph circuits only one transmission can be made per telegraph line. Operating speed on telegraph circuits is 3, 4 or 5 fully punched 80-column cards per minute, depending upon the use of 60, 75 or 100 words per minute circuits. When telephone circuits are employed, up to four independent simultaneous transmissions can be made per line, with an effective 80-column card output of 10 to 11 per minute, per machine. The speed will vary depending upon the use of the printing or non-printing machine, since with the print feature approximately 14 card columns per second can be transmitted, while the machine not equipped for printing can send approximately 16 card columns per second. In our installations, all field located machines are the printing type, while the machines in the Home Office do not have this feature. All of our 80-column card transmissions, therefore, produce a 10 card per minute output. A greater number of cards per minute can be realized by sending less than 80 columns of data.

Data Transceiver Components

The Data Transceiver itself consists of two units, a modified card punch (*024 or 026 type*) to which is cable-connected a signal unit contained in a separate cabinet. When set to transmit, the punch reads a card, one column at a time, and sends its reading to the signal unit. The signal unit converts the punch readings into impulses which in turn are sent over the telegraph or telephone circuit to the receiving machine. At the receiving machine the impulses received over the circuit are checked in the signal unit for validity, converted to I.B.M. punched card codes, and sent to the punch which punches a card. The transmitter and the receiver are both controlled by drum mounted program cards which control skipping, duplicating, printing, skipping, and various interlocking machine signals.

Four field stations plus the central office are the maximum number of installations for simultaneous transmission on any one line. This is accomplished through the technique of channelizing. This can be illustrated when it is realized that to transmit a human voice over a telephone circuit it requires a span of cycles per second ranging from a low of about 500 to a high of about 2600. To operate a machine on a telephone circuit, the span of cycles per second under which it will operate is quite limited, in fact the nearer to a set level that transmission can be maintained, the better the transmission results. To accomplish multiple transmissions over a single circuit each Data Transceiver is equipped with a pluggable channel selector pre-tuned to a specific cycle per second frequency. Channel 1 is pre-tuned to 800 cycles per second, channel 2, 1300 cycles per second, channel 3, 1800 cycles per second, and channel 4, 2300 cycles per second. During transmission the signals sent over the circuit are a mixture of the above frequencies, each frequency originating from the machine with the appropriate channel selector. At the receiving stations each Data Transceiver selects the cycles per second tones which correspond to its channel selector, ignoring all others. Of course, with such an arrangement, it is not possible to operate Data Transceivers and talk on the circuit at the same time.

Suitable check circuits are incorporated in the machines to produce a high degree of accuracy in information transferred. Among these checks is a synchronization pulse that precedes the code pulses for each character transmitted, an end-of-card signal which in effect asks the receiver if it is satisfied with the card just received, and a "go ahead" signal from the receiver if all checks are satisfied. The code pulses representing the 10 numerical characters, 26 alphabetic characters, and 11 special symbols, are represented by a four bit code. There are eight code elements, four of which in certain combinations comprise the 47 characters it is possible to send by Transceiver. Characters transmitted can then be checked since each should consist of four code bits representing a valid character and mutilations can be accepted only if one or more code bits are lost and then replaced by a corresponding number of bits to satisfy a valid code. Additional checks relative to failures to read, punch, skip, feed or duplicate are also made and both machines are stopped should such conditions occur. All cards received correctly are automatically punched with a 12 in column 81 at the time of ejection from the punch bed. Incorrect cards are not punched in column 81.

In addition to the read-punch and signal units, there is a small control unit, cable-connected to the punch and resting on the reading board of this machine. The arrangement is similar to the keyboards of punches and verifiers. This control unit contains various keys and switches used during operation of the machine. Signal lights are also incorporated in this unit allowing the operator to determine the cause of incomplete card transmissions and also enables her to communicate to a limited degree with the operator at the other machine.

In beginning machine operation each day, all parties are brought together by telephone on the circuit, receiver levels are set (*this is an adjustment made on both machines which cuts down or boosts the signal being received to align it for maximum efficiency*), and any pertinent information regarding the scheduled data transmission is exchanged between operators. From this point on, the schedule is followed until all items for that day are sent or received. The telephone circuit is then placed at the switchboards for use in placing long distance calls on a toll free basis. Our

volume application for our Transceivers deals with the transfer of auto renewal billing information. In receiving renewal billing information from our regional office, the policy number, certain information to be updated, and the rating factors are received. After calculation on the 650, the policy number, updated information, and the premiums are returned to the regional office.

Data Transceivers may be used for much more than just the transfer of renewal billing information. Other applications include the receipt of claim, premium and expense information from regional offices for central compilation into company wide management reports. In this manner the accounting month may be closed more rapidly than under the regular mailing system, and management may have operating results at an earlier date.

As an indication of the extent of the operation at Nationwide, approximately 650,000 cards per month are sent or received over the Data Transceivers. The efficiency of both machines and circuits is measured by a monthly percentage calculation of incomplete card transmissions per 100 cards for each station and circuit. The acceptable ratio is one incomplete transmission per 200 cards transmitted.

Nationwide Insurance has gained valuable experience on the transmission of data from distant points as a result of its Data Transceiver installations. Although they are not completely satisfied with the potential of the system so far as speed or additional volume growth are concerned, the knowledge accumulated should be a tremendous help in installing and operating a more advanced system. The ideal communication system would be a tape Transceiver which would input directly into the storage of a large computer. This system is under consideration by Nationwide for the future. ■

RENTAL vs. PURCHASE *(continued from page 12)*

C. Estimating Savings

When accumulated rental costs exceed accumulated purchase costs, then savings begin to accumulate for purchase compared to rental. Since costs are accumulative, the difference between them represents accumulative savings; for example, for the 705, C.P.U., on two-shift, five-day week basis, the savings at the end of three years are the difference between $731,412 in rental costs and $539,661 in purchase costs or $191,751 in accumulated savings since the breakeven point of nineteen months, *see Fig. 2.*

Some savings are possible for purchase over rental on a one shift basis, but for substantial savings, enough to make purchase worthwhile, two or three shift usage is required, *see Fig. 3.*

Corporate income taxes do in a sense reduce any potential savings; however, they were not applied to the savings given in the examples.

The graphs shown of estimated costs and savings for the 705, C.P.U. are intended as examples only, not as the final and only correct solution. ■

Fig. 2—Accumulated savings and costs—5 day week 2 shifts

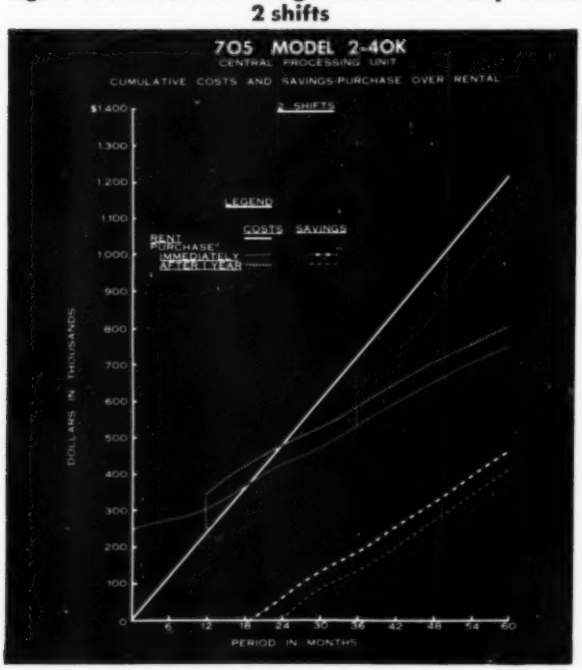
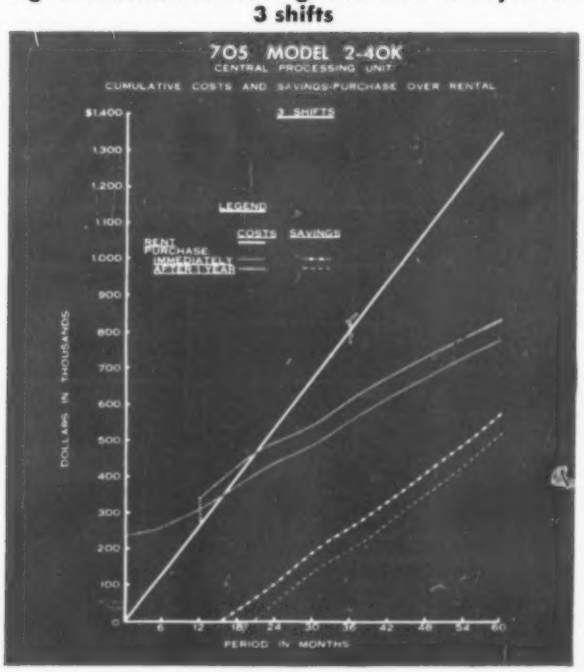


Fig. 3—Accumulated savings and costs—5 day week 3 shifts



INVENTORY

650 Evaluation for Production Control

Maintaining a balanced inventory of thousands of parts subject to rapid depreciation, sparked the need of one company in the radio-television industry to transfer operation from punched cards to electronic computer equipment.

By Jack W. Schrey

Introduction

FOR THE FIRST TIME, Magnavox has obtained equipment that can logically perform successive clerical functions until the final desirable results are obtained.

The Magnavox Company manufactures Television and Radio-Phonograph instruments from component parts purchased in the industry. While sales activity, engineering, billing and purchasing departments are located in Fort Wayne, Indiana, the manufacturing plants are spread over four different locations. These multi-plant facilities produce an annual sales volume of approximately $100 million and involve about 5,000 employees.

The reduction of data at the four plants was done on punched card equipment and transmitted via tranceivers to Fort Wayne, about 470 miles away.

Early Punched Card Operation

The application of punched card equipment within the company includes:

1. *Payroll and allied labor reports.*
2. *Material control of inventory and purchases.*
3. *Production reporting.*
4. *Finished goods inventory control.*
5. *Accounts Payable.*
6. *Invoicing.*
7. *Processing of customer orders and packing slips.*
8. *Sales analysis.*
9. *Cost of sales.*
10. *Expense ledger and budget comparison.*
11. *Miscellaneous Reports.*

This represented the mechanization of the major manual clerical function with the company.

As business expanded, the punched card equipment was found to be too slow to present certain data needed in the maintenance of balanced inventories. Model changes, due to constant engineering revisions, are inherent in the television industry. Magnavox product line includes a wide range of models and finishes, each model custom-designed. Less than half the component parts are common to two or more models. They have no distributors, consequently the production control must be very closely related to customer requirements. Production activity demanded knowledge of the current status of all components and assemblies.

The punched card equipment furnished this information on a semi-monthly basis, which was not adequate to make the day-to-day decisions required. Consequently, a high speed computer was the only solution.

IBM 650 Displaced Punched Card

After the IBM 650 was selected, personnel acquainted with company accounting problems were assigned for training almost 14 months before delivery of the computer. These men learned the techniques of operation, prepared programs and planned training programs for other personnel.

A study of the primary problem, of providing quicker and more up-to-date records upon which day-to-day decisions could be more adequately based, was started with the explosion of the parts list or Bills of Materials. This had been the deterring factor in an economical tabulating system of material control records. It was found that daily inventory balances of quantity records for 15,000 parts could be maintained using the computer at Fort Wayne and tranceivers to relay card-to-card information from remote plant locations. The flow of information and the rapid processing by the computer provided local management with data on which day-to-day scheduling could be provided.

In comparing the two methods of processing data it was noted that not only time, but cost and accuracy favored the computer.

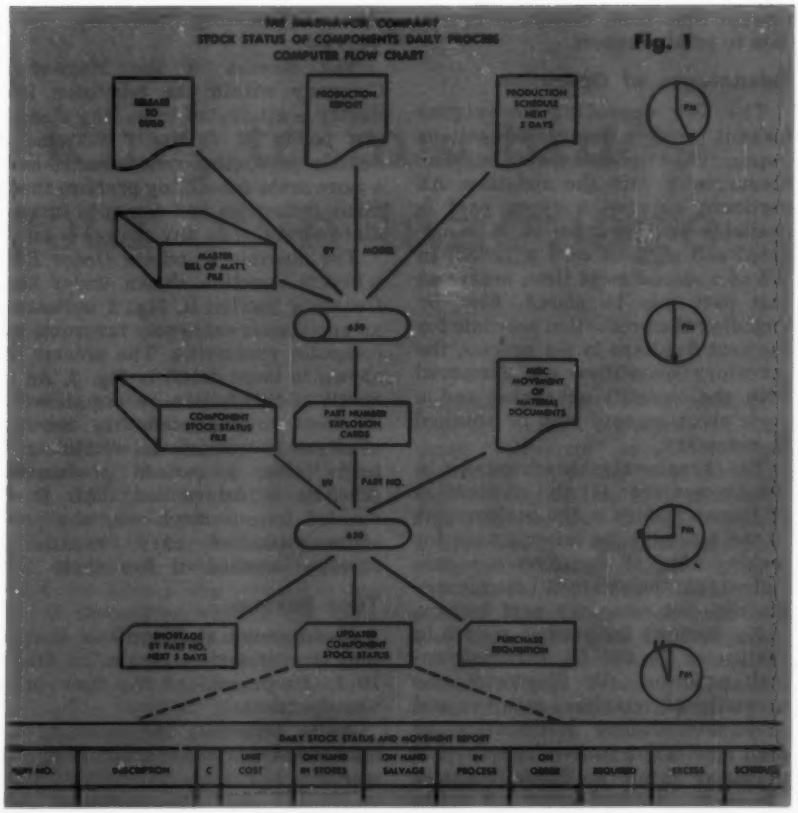
Table

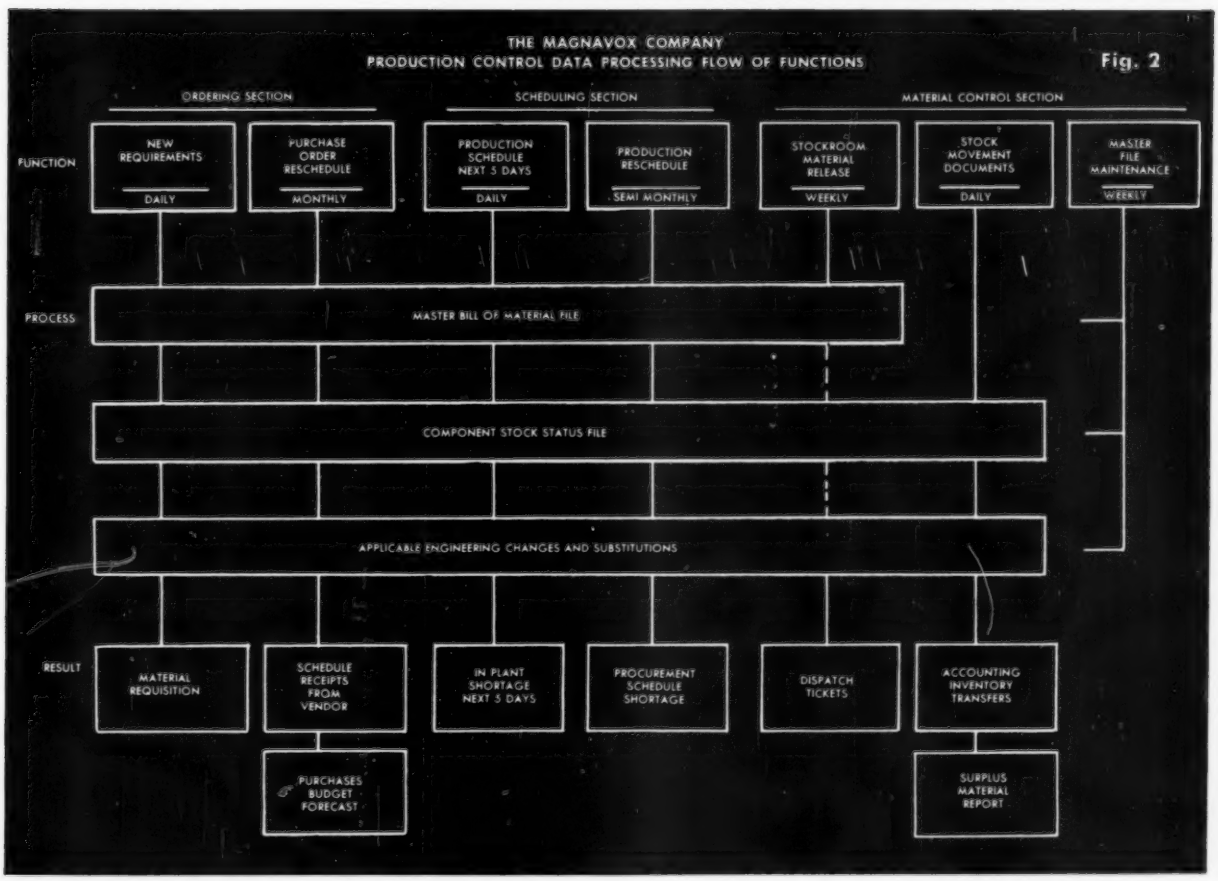
	Computer	Tabulating System
Processing Time	*58 min.*	*18 hrs.*
Handling Cards (No. of Times)	*1*	*18*
Separate Processes	*1*	*9*
Operators' Time (Percent)	*5*	*40*

Cost of Machine and Labor	*$26.00*	*$37.50*
Cost of Supplies	*$ 2.00*	*$ 2.00*

Other advantages of computer operation were: material requisition could be prepared more accurately from computer information, mechanization of the production count of sub-assemblies daily in time to provide information required by the computer, elimination of a large five-section form and substitution of a smaller tab card form for machine counting, elimination of one employee and savings of $6,000 in cost of forms. Bills of Materials represent the base from which requirements are determined. Material is dispatched from the stockrooms to various production areas. Production relief is obtained in book inventory.

Stock Status and Movement Report, shown in chart in **Fig. 1,** is a daily compilation of the results of Bill of Materials explosions and other documents denoting the movement of materials within the plant. This indicates the information source and the step-by-step operation in the process flow to maintain current quantity records on each part. The clock time, shown to the right, reflects the overall





process time from receipt of source data to printed report.

Advantages of Operation

The 650 operating techniques make it possible that certain actions requiring the updated status be taken concurrently with the updating. All pertinent data on a given part is available on the drum as it is updated and a result card punched. In 3/5 of a second more time, orders on that part may be placed. Also, by including the production schedule for the next five days in the process, the inventory quantities are compared with the quantity scheduled and a parts shortage card may be punched if necessary.

The three invaluable advantages in the process are: **(1)** the elimination of human failure in the performance of the task; **(2)** the criteria used for making clerical decisions are consistent; **(3)** the action is taken immediately—not when it's past history.

Fig. 2 shows the present growth in the use of the 650 for material control problems. It illustrates the necessity of complete, accurate and up-to-date master information as each application passes from the Bill of Material file to Stock Transfer file on to the final reporting stage.

Acute Scheduling Problems Solved

The success of the Magnavox Company within the television industry is attributed to its long standing policy of retaining extremely flexible production schedules. It has a more acute scheduling problem than many industries and demands immediate action when any change occurs.

The monthly Purchase Order Reschedule function shown under the Ordering Section in **Fig. 2** indicates an application extremely favorable to computer processing. The process is shown in more detail in **Fig. 3.** As a result of this action, information is available to reschedule the receipt of all purchased material within eight hours after a revised production schedule is determined. This is a decided improvement over the previous punched card, manually screened method of five days.

Time Savings

Management at Magnavox claims they are receiving results in from 10 to 20 percent of the time previously taken.

As to personnel, the necessity of many hundred clerical overtime hours monthly has been eliminated; five employees have been released for other duties; and fifty percent of six other employees' time has been reduced.

The computer processed the factory payroll at the Tennessee plants in one twentieth the time previously required.

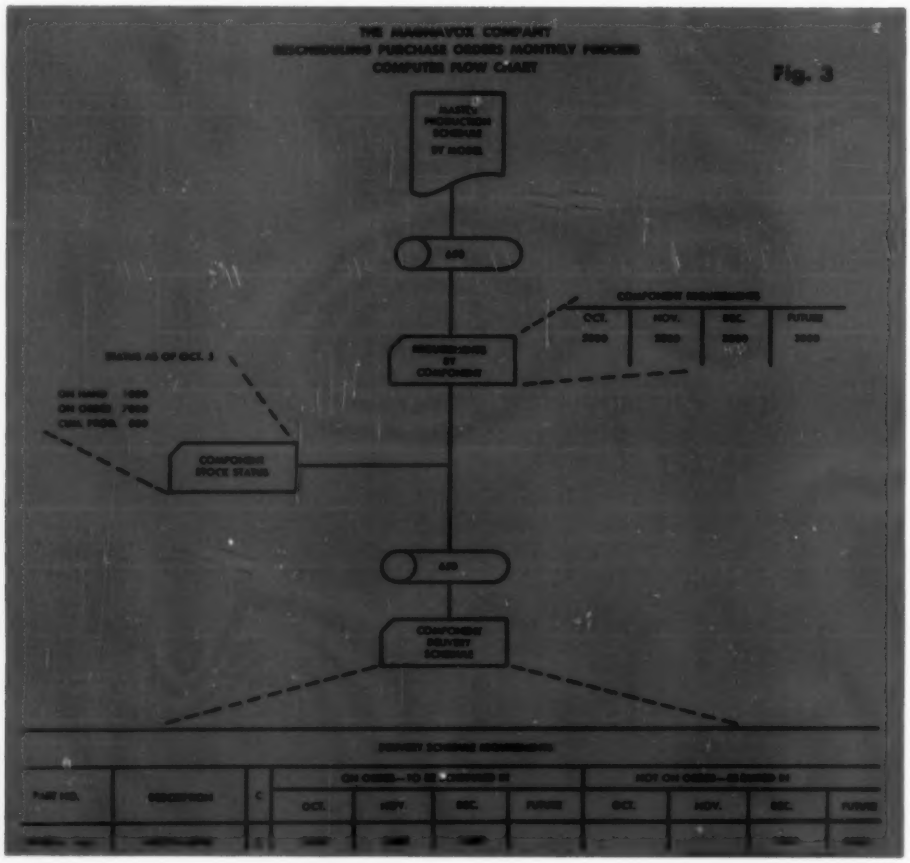
Most important is the intangible savings in material inventory surpluses and obsolescence that tend to creep in unless prompt action is taken at the right time.

Finally, production management may work today with data reflecting the results of yesterday's action, instead of being forced to use historic updated reports.

Future Plans for Computer

In the future, it may be possible to prepare purchase requisitions on the computer, and perhaps automatically prepare the actual purchase order.

The IBM 650 data processing machine has provided production management with a tool through which they may obtain answers in time to take adequate corrective measures to insure a continuous flow of material throughout production processes. ■



FLOW-MATIC...

Talking to machines in your own language

Thirty English words a clerk can code and a computer "understand" are the basis of Rem-Rand's automatic programming device.

ELECTRONIC "BRAINS" LACK INITIATIVE; it is a human brain which must outline their task. Programming is the process of writing the detailed instructions that will result in the computer performing the computations desired. Unfortunately, many companies have found that they underestimated the expense, in money and time, involved in programming. It is not surprising that many people in the field have devised methods whereby computers can perform some of the preliminary work as well as carry out the subsequent computations. These methods usually fall under the classification "Automatic Programming" and the newest on the market is Remington Rand's "Flow-Matic."

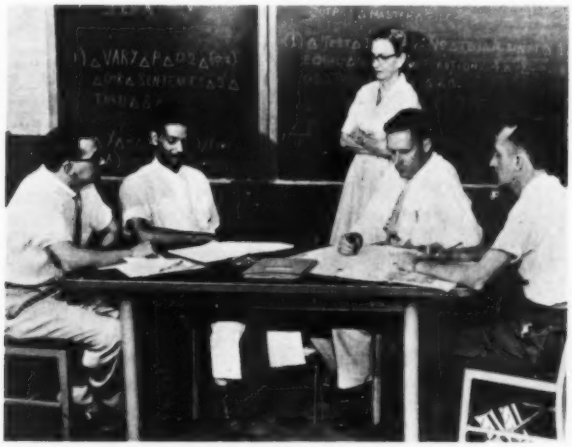
The term *programming* is generally used to encompass all phases of the analysis, planning and effecting of a particular application. The customary product of the analysis and planning stage is a flow chart that indicates the source of the information, where it is going, and what is to be done to it along the way. Transposing the flow chart into a set of instructions written in a "language" which the computer understands is known as coding. Basically, most of the existing Automatic Programming techniques are techniques for Automatic Coding. There have been many: Autocoder, SOAP, Fortran, Speedcoding, Intercom, JAZ, Trans-use, Datacode, etc.

In the early days of data processing computers, programmers *(perhaps we should say coders)* often found themselves writing the same set of instructions over and over again. The prime example is the computation for finding the square-root of a number. Most computers have commands only for adding, subtracting, multiplying, and dividing. To take a square root it is necessary to write perhaps twenty to thirty of these basic instructions. However, once written, the same set of instructions could be used in another program. Such frequently used sets of instructions are called subroutines and nowadays most installations contain a library of sub-routines available to all programmers.

The next stage in the development of Automatic Coding was the interpretive routine. This is a special set of instructions stored in the memory of the computer that enables the programmer to write one symbol, perhaps the number 53, which the computer "interprets" as a square-root command, extracting from its memory the desired set of instructions. One difficulty here is that whenever a square-root is called for the computer must take the time to interpret the code 53. While this may be milliseconds fast, when used over and over again, the total time required can be costly. As a result, compilers were developed. This is a special set of instructions used each time a program is written which will allow a programmer to write a simple program and produce an output program containing all of the necessary subroutines, etc. Compilers also assign locations in memory and do other tasks for the programmer.

Concurrent with the development of compilers was the development of techniques of relative or symbolic programming. The memory of a computer may be compared to a great many mailboxes, each having an address. The programmer decides to store some particular quantity, such as hourly rate of pay, in a particular mailbox. If the machine is a binary machine, as most are, the address of a mailbox might be 10100010.

MARILYN MEALEY at the console of a Univac I computer in the Philadelphia laboratory.



Dr. Grace Murray Hopper and associates working on Rem-Rand's "Flow-Matic."

Fig. 1 **FLOW-MATIC Call Words and Functions**

ADD:	Adds two or more fields and places the result in a specified field.
CLOSE-OUT:	Terminates the output files.
COMPARE:	Examines two fields for magnitude and equality, and branches accordingly.
COUNT:	Adds an increment to the field specified and, if desired, branches upon reaching a limit.
DIVIDE:	Produces the quotient of two fields and places it in a specified field.
EXECUTE:	Performs the designated operation or series of consecutive operations.
FILL:	Places a specified constant into one or more items or sub-items.
HALT:	Stops the computer and indicates the number of the operation at which this stop occurs.
IGNORE:	Provides a method for adding or deleting operations.
INPUT:	Identifies the data files used in the problem.
INSERT:	Places a specified constant into one or more fields.
JUMP:	Alters the normal sequence of execution of operations.
MOVE:	Places one or more fields of data into any other field or fields.
MULTIPLY:	Produces the product of two fields or a field and a constant and places it in a specified field.
NUMERIC-TEST:	Examines the contents of one or more fields for numeric data and branches accordingly.
OVERLAY:	Replaces a designated portion of the previous operations with a new set of operations.
PRINT-OUT:	Prints on the Supervisory Control Printer the contents of specified fields and constants.
READ-ITEM:	Supplies the next item of an input file and branches to a designated operation when the file is exhausted.
REPLACE:	Replaces designated characters within a field with other specified characters.
REWIND:	Rewinds the current reel of an input file.
SELECT-LEAST:	Examines the keys of the items of two or more input files and branches to the operation indicated for the item whose key is smallest in magnitude.
SET:	Modifies an operation and thereby alters the sequence of execution of subsequent operations.
STOP:	Terminates the problem.
SUBTRACT:	Subtracts two or more fields from the designated field and places the result in a specified field.
SWITCH:	Provides a branching point.
TEST:	Examines a field and one or more constants for magnitude and equality, and branches accordingly.
TRANSFER:	Places an item or sub-item into any other item or sub-item of equal size.
TYPE:	Permits the type-in of information from the Supervisory Control Keyboard into the specified fields.
WRITE-ITEM:	Places an item onto an output file.
X-1:	Provides the facility for performing functions not heretofore described.

Since it is simpler to write the number 162 the computer usually contains a set of instructions in its memory in order to translate the number 162 into binary notation. It is a simple extension of this idea to have the programmer write the word "Rate." The compiler *(the set of instructions placed in the computer for that purpose)* will assign some mailbox to be used to store the quantity which is the rate of pay. Similarly the programmer uses the word "Hours." When he wants to compute the amount of pay he merely instructs the computer to multiply together the quantities in the mailbox marked "Rate" and the mailbox marked "Hours." There are many advantages to symbolic programming, arising from the mnemonic character of the words: it is easier and faster to program, and the chances for clerical errors are fewer.

Instructions to a machine must also be in the machine's own language. Thus, *to add* might be the binary number 11001. Again, it is easier to write 25, and even easier to write "Add." The compiler takes the word "Add" and translates it into machine language. In addition to the advantages in speed and accuracy, programs written in a symbolic language are easier to debug, and they are particularly adapted to study by other programmers. And, if a programmer is obliged to change a program several months after he first worked on it, he can usually remember his original thought processes better if he used symbolic programming.

Symbolic programming has been in common use for a long time. The symbols used, however, have been varied. For instance, "A" may have been used for add and "S" for subtract. However, the more a symbolic scheme resembles common usage English, the more it partakes of the advantages mentioned above. Flow-Matic uses readily understandable English words as the programmer's manipulative symbols.

Before describing Flow-Matic itself, another point must be mentioned. The compiler can pick out a whole set of instructions as the result of only one instruction written by the programmer. Thus, if it is desired to choose the smaller of two quantities, A and B, it usually takes three or four simple instructions. It would obviously simplify things if the programmer could write something like "Take Smaller A, B" and have the machine fill in the necessary steps. Similarly, it would be desirable to write "Root B" to instruct the compiler to gather the necessary instructions for taking the square root of the number B. In addition, the compilers, as previously mentioned, assign the storage locations, prepare the program for automatically rerunning certain loops when the same computations have to be repeated, etc.

Flow-Matic Uses English

The most obvious feature of Flow-Matic is that the symbols are commonly used English words. A program is written in simple sentences which resemble ordinary English sentences except that they are a little stilted, and rather monotonous. Flow-Matic was developed at Remington Rand under the leadership of Dr. Grace M. Hopper. Dr. Hopper, who has been active in the computing field for quite some time and has had a variety of assignments, as well as a background in mathematics, has written many articles on Automatic Programming. She is presently Director of Automatic Programming Development, Remington Rand UNIVAC. Dr. Hopper long recognized the need for simplifying the programmer's task, and eliminating the coder's task. In striving to develop a compiler based on common words, her theory was that it is "much easier to teach a computer English than to teach a person machine language — no temperament, no personality quirks, no arguments."

The objective was to allow a programmer to write phrases like "deduct group insurance amount from adjusted pay." This sentence mainly is made up of a verb and two nouns, with a "with" for proper syntax. "Group Insurance Amount" and "Adjusted Pay" are the nouns, and are the sort of symbol described

earlier—they refer to memory locations. "Deduct" is the verb that tells the computer what to do, and the compiler, in this case Flow-Matic, interprets the verb and produces a program containing the proper instructions. Flow-Matic has been standardized to include thirty basic words—these are shown in the accompanying table. (*See Figure* 1.) Part of a program using these verbs is also shown. (*See Figure* 2.)

A user of Flow-Matic is quoted as saying "The chief advantage of such a system . . . is that the use of English words . . . permits various levels of management . . . to transmit their ideas from system flow charts directly into the running programs." This is not completely true. The *precise* verbs used in Flow-Matic must be used, and there are many rules governing the order of quantities and the use of connecting words. Thus, it is not true that *anyone* can start coding by simply writing out what he wants in English. However, what may be true is that a systems man can draw a flow chart of a particular application and turn it over to a clerk for coding.

Clerks Can Code

Teaching clerks to code is feasible. Marilyn Mealey, a young graduate of a business course, came to work at the Univac Laboratory as a typist. She was taught to code in Flow-Matic and after only two weeks Marilyn is reported to have said like Professor Higgins in "My Fair Lady," "It's second nature to me now." She works directly from flow charts prepared by programmers. It should be pointed out that the beginner works with the simpler flow charts and as experience is absorbed more and more difficult assignments can be handled.

Remington Rand emphasizes the advantages to be gained from a training standpoint. On the surface, it would seem that thirty symbols could be memorized as rapidly as the particular English words used by Flow-Matic. However, experience indicates that the more something new resembles something known the more rapidly it can be learned.

Aside from the training aspects, there are obviously many advantages to using mnemonic symbols such as "Add" and "Compare." The intelligibility of the program to non-programming personnel makes possible more effective communication within a company regarding a given application. Flow-Matic's developers may not have been originally so motivated, but this decrease in the need for technical jargon is a great boon.

Perhaps more important, the emphasis now placed on the computer coding aspects of the job may be concentrated on systems design, problem definition, run analysis and programming. And major efforts expended in these latter areas have been shown to yield the greatest effectiveness in the total computer system.

The Air Materiel Command of the United States Air Force has announced that they have developed a version of Flow-Matic modified for their particular needs. This is called AIMACO, the Air Materiel Command Automatic Compiler. "This is a tremendous forward step in the data processing field," said General E. W. Rawlings, Commander of the Air Material Command. "It means important improvement in two difficult areas: explicit definition and understanding between management and computer programmers, and relief from the expensive drudgery of writing machine programs. Both of these will result in measurable dollar savings."

Flow-Matic was primarily developed for the UNIVAC II. But, as Dr. Hopper points out, words like "Add" and "Compare" do not refer to a particular computer, nor does "Group Insurance Amount" indicate whether the storage medium to be used is paper tape, punched cards or magnetic tape. A compiler could be prepared for any computer which would accept a program coded in Flow-Matic and produce a program in the language of the particular machine.

Thirty words are certainly a long, long way from Basic English; along with its immediate compiler advantages, however, Automatic Programming such as Flow-Matic takes automation a giant step into the future. ■

Fig. 2 SAMPLE PROBLEM
PAYROLL — FLOW-MATIC CODE

(0) Input Master file - A
Hours - worked file - B
; Output Payroll file - C
; HSP C.
(1) Compare Badge - number (A) with Badge - number (B); if greater go to operation 17; if equal go to operation 2; otherwise go to operation 20.
(2) Test Badge - number (A) against Z — Z
; if equal go to operation 22
; otherwise go to operation 3.
(3) Transfer employee in A to employee in C.
(4) Multiply hours - wkd (B) by hourly rate (A) Giving gross - pay (C).
(5) Test mode - code (B) against ϕ
; if equal go to operation 6; against 1
; if equal go to operation 11; against 2
; if equal go to operation 13; otherwise go to operation 15.
(6) Move gross - pay (C) to net - pay (C).
(7) Write - item C.
(8) Read - item B; if end of data go to operation 1.

International Systems Meeting

THE INTERNATIONAL SYSTEMS MEETING, which was held October 13-15, 1958 in Buffalo, N. Y., was a major U. S. conference devoted exclusively to the systems field. With a format singularly arranged for the convenience of its conferees and a program packed with authoritative talent, it was a meeting rich with the revelation of creative system and procedural techniques, and the opportunity to exchange views with the 1500 participants in the main body of the conference and those who sold out the Panorama, its subsidiary course.

The Conference was unique in several aspects. Except for two general membership meetings, instead of registrants spending a good portion of their time reviewing the schedule and hustling from one seminar or general meeting room to another, each conferee obtained a permanently reserved seat at a 20-person table assigned to an approximately 400-person "group" which allowed the meeting to come to him., i.e., speakers repaired to various rooms, sometimes giving a talk three times, as in the case of the popular author of that wise and witty book, "Parkinson's Law," C. Northcote Parkinson. When a speaker's schedule did not permit such an arrangement, as in the case of consultant John Diebold, a general meeting was arranged.

A management decision "game" on systems was played by the conference group. Called SMART — Systems Managers' Administrative Rating Test—it was billed as a "dynamic test of actual skill in administering systems." Business "games" are becoming prevalent in a variety of applications; this is the first one aimed at the systems field. It was developed by The Systems and Procedures Association and the Taylor Management Lab of Wharton School. An IBM 650 Ramac, which scored the game, was a novel source of information for locating registrants since it was used as an electronic information booth. Registrant's name, company, seat location, etc., were stored in memory and available through the on-line inquiry station.

Systems Panorama

The Systems Panorama, a special course designed to give businessmen a broad, though basic, insight into all the working techniques of the systems field, was arranged so that registrants for the Panorama could review the exhibits, take part in SMART, and hear most of the ISM speakers.

Exhibitors included most of the major companies in the business machines, computer, forms, special purpose and auxiliary equipment fields. There were comprehensive exhibits of systems periodicals, syllabi of systems courses, procedure manuals, actual systems descriptions and such special exhibits as the Electronic Voice Mirror, Nike Installations System, British Government organizations standards—supplied in detail by its Treasury Office, the Solartron Electronics Group, Ltd.—and the Interplanetary Clock.

The Systems and Procedures Association was organized in 1944 as an international professional group of administrative executives in business, commerce, education, government and the military. It engages in a continuous program of research, study, education and training in the fields of management practices, systems and procedures, and organizational techniques. There are at present about 2,600 members spread throughout 57 local chapters, each consisting of no more than 75 members in major cities of the United States, as well as chapters in foreign countries.

Distinguished Speakers

At the 1958 International Systems Meeting, from a roster of speakers, all of them distinguished, representing the U. S., Great Britain, Japan, Germany and the Netherlands, it is possible to mention only a few: Speaking on business in the U. S., *Bernard Kilgore*, President of The Wall Street Journal; appraising British and European Business systems, and the Asian viewpoint of today's business, respectively, *Geoffrey J. Mills*, Deputy Chief Controller, J. Lyons & Company, Ltd., London, England, and *T. Yoshami Arai*, representing the Japan Productivity Center; describing the development and operation of an existing totally integrated system in Germany were *George Reinicke* of Grossversandhause QUELLE and *Dr. Robert Rosenkranz*, President, Rosenkranz and Schneider, Munich, Germany. (These gentlemen provided extraordinary interest on two levels: the latter spoke partly in German while a device flashed "titles" on a screen over his head during his talk, and the former revealed that, sent to the U. S. after the war to study our mail-order house systems, he decided they were completely inadequate for the task and went back to Germany to install a fully automatic system for "Quelle," which is considered to be the largest and most modern equipped mail order house in Europe.)

Other speakers included were: *J. E. Angle*, Vice President, Industrial Engineering, United States Steel Corporation; *Lt. General James D. O'Connell*, Chief Signal Officer, Department of the Army, Washington, D. C.; *A Meeuwis*, Manager, Organization, Administrative, Methods, Services Department, N. V. Philips Gloeilampenfabrieken, Eindhoven, Netherlands; *Dr. Robert K. Burns*, Associate Dean of the School of Business, Executive Director of the Industrial Relations Center, The University of Chicago; *Neil Pollock*, Manager of the Organization and Methods Department, Stewarts & Lloyds, Ltd., Birmingham, England; *Dr. Herbert P. Galliher*, Operations Research Project, Massachusetts Institute of Technology, Cambridge, Mass., and *Andre G. Clavier*, Vice President, ITT Laboratories, Division of International Telephone and Telegraph Corporation, Nutley, New Jersey. ■

The IBM 7070 DATA PROCESSING SYSTEM

IBM HAS ANNOUNCED THE 7070 — official pronunciation, the seven-oh-seventy. In the usual classification of small, medium and large scale computers, the 7070 might be described as the "almost as large." The rental for the basic system is about $12,000 per month, but data processing systems today admit a variety of configurations, and a 7070 installation with possible card readers and punches, tape units, on-line printers and Ramacs could easily cost as much as a 705 installation. It is with the 705 that the 7070 is competitive.

At first glance, the 7070 seems to have all of the features that are desirable in a computer. Although it is not as useful as the 705 where variable length alphabetic records are important and it is not as fast as the 709, it does have a great number of new and useful features. It is also transistorized. *(IBM has announced its intention of utilizing transistors in all future computers, and transistorized 709's and 705 Model III's will probably make their appearance on the market.)*

The high speed core storage is available in either 5,000 or 10,000 words. Each word consists of 10 numerical digits and sign. The sign position can also indicate whether a word is numeric or alphabetic — in the latter case one word equals five alphanumeric characters. Two-out-of-five coding is used in core storage. Thus there are five bits: 0, 1, 2, 3, 6, and any digit can be indicated by two of these five. This uses cores less efficiently than the 1, 2, 4, 8 scheme but allows better validity checking. Every digit that is moved to and from storage is tested to assure that it has exactly two bits, no more and no less.

An outstanding feature of the 7070 is parallel transmission of data to and from core storage. An entire word, including sign, is moved all at once, instead of one bit or one digit at a time. A channel for parallel transmission thus consists of 55 lines. This allows a word in core storage to be moved in 6 micro-seconds.

The 7070 systems may have up to three input units and three output units. Input units are Type 7500 Card Readers. Output units are either Type 7550 Card Punches or Type 7400 Printers. The Type 7500 can read up to 400 cards per minute; by using three card readers simultaneously it is possible to achieve a speed of 1200 cards, which is 96,000 alpha-numerical characters, per minute. Various validity checks are provided for input. When a two-out-of-five error is indicated the data is automatically re-transmitted and if still in error on the second try, an error indicator is set. An extra reading station provides the possibility of additional checking.

The Type 7550 Card Punch has a speed of 250 cards per minute. Validity checks are operative here also, and the control panel provides for double-punch blank-column detection. The on-line printer is similar to the IBM 407, with 150 lines per minute and 120 characters per line. A special feature allows the printer to communicate back to the main computer. A conventional carriage tape is used with a hole in channel 9 setting up the return signal. This enables the computer to know just which line is being printed thus providing branches for such things as page totals.

Up to 12 magnetic tape units may be attached. Called Type 729 Model II and Type 729 Model IV, these are identical to the Type 729 Model I and Type 729 Model III used with the 705 Model III system.

They have the twin-head feature which provides for checking written information through reading by the second hand. The 729 Model II has a speed of 15,000 alpha-numerical characters per second; the 729 Model IV has a speed of 62,500 alpha-numerical characters per second. A particularly important feature is the possibility of simultaneous read-compute-write. It is possible to simultaneously read information from a tape into core storage, read information from core storage onto a tape and continue the main program.

Another important programming tool is the scatter read/write operation. A single record read from tape can be divided into as many parts as desired by the programmer, and distributed into different blocks of core storage on one program step. The same feature can be used in writing tape. This means that a record need not be stored in continuous core locations. The feature is made possible by special record definition words placed in memory.

The 7070 system allows for an on-line Ramac. A special feature is the automatic selection of reading arms. Three reading arms are used, but instead of the programmer remembering which one is free, the computer automatically selects a free arm. As many as 10 inquiry stations are available. Any record in storage can be examined and its contents typed out at the interrogating station.

The console contains a typewriter which can be used for output under control of the program. The typewriter is also used to display the contents of any storage locations and is particularly helpful when debugging a program.

The program is normally sequential, and the usual branch operations are provided. Each instruction is one word *(10 digits and sign)*. Two digits and sign for operation code, two digits for indexing word, two digits for control and three digits for address. An outstanding feature of the 7070 is "Automatic Priority Processing" which makes it possible to run two programs simultaneously. While the program advance is held up for operation completion in the main routine, a step in a priority routine can be processed and the machine returns to the main routine upon its completion. There is no delay; one program or the other is constantly functioning.

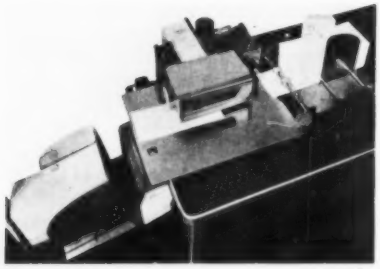
An assembly system and utility programs are in preparation, including tape sorting and merging, storage clearing, storage to output, loading and tracing routines. Floating decimal operation is also available on an optional basis.

■ ■ ■

PRODUCTS & SERVICES

IBM TYPE 88 COLLATOR

The new IBM Type 88 Collator is almost three times as fast as its predecessor—650 cards per minute vs. 240 cards per minute—and it costs about three times as much. Its major benefits, therefore, are that it has greater capacity, reduces card handling time, and permits one operator to do three times as much work. Among its new features are included: an extra set of reading brushes which permits sequence checking of both decks of cards, a file feed device which permits the loading of full trays of cards *(about 3000)* in the primary feed, a fifth pocket which permits simultaneous merging, matching and selection of cards from both feeds on a separate condition, and a stacking principle which permits card removal without stopping operations. It is also capable of double punch and blank column detection. IBM Data Processing Division, 112 East Post Road, White Plains, N. Y. ■



SCRIPTOMATIC MODEL 10

The Model 10 Scriptomatic is an addressing machine intermediate in size between the larger fully automatic models and the hand units. It is light in weight and simple in operation; it mounts conveniently on any table or desk. When hand fed all functions of the machine are set in operation by the insertion of the material. An automatic feeder is available as an attachment. Scriptomatic, Inc., 310 North 11th Street, Philadelphia 7, Pa. ■

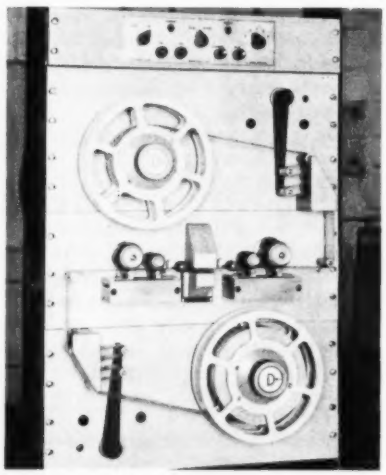
FRIDEN'S NEW SYSTEMS LINE

As of January 1, 1959, the Friden Corporation will supply a new line of Flexowriters to be known as the Systems Models, which, through standardization, will permit improved sales and delivery schedules. Each Friden Systems Flexowriter Model will be provided with standard plug-ins for input and output. One of the following input devices may be attached: a punched tape reader, an edge punched card reader, or a Selectadata. Available in place of the conventional attached tape reader or edge punched card reader is a reader for IBM punched cards. One of the following output devices may be attached: a motorized tape punch, an IBM Type 024 keypunch, or a solenoid list-add machine. The conventional Flexowriter, in this Systems Line, will be equipped with control switches which will permit initiation of controls automatically as the carriage moves. This equipment is available in eight channel tape only. Friden, Inc., Rochester, N. Y. ■

THE MASTERMIND 1500

A new-type computer costing approximately the same as two clerks' salaries has been designed by Matronics, Inc. The computer can be used for inventory control, sales information control, commissions, quotas or budget control, scheduling of equipment and manpower, or processing of credit, accounts receivable and bank account information. Called the "Mastermind 1500" digital computer, the new machine when used for inventory control can select in seconds from memory, post, and tally the sales, inventory and in-process record for one of five hundred items. Through the use of multiple, individually placed keysets, this information is available not only to the computer clerk, but also can be relayed to the desk of the company president or other executives.

The "Mastermind 1500" can be rented for $400-$500 per month, or purchased for $8,000-$15,000, depending on the model. The computer consists essentially of two parts, a data storage and processing unit and a keyset. The storage and processing unit, in a metal cabinet, is mounted rigidly to a table-type desk; the keyset, about the size and appearance of an adding machine, is an integral part of the desk. All control of the computer is through the keyset — no auxiliary tapes, punched cards, typewriting equipment or other data processing devices are used. Multiple keysets can be installed. The computer is programmed at the factory and is ready to operate when installed. Matronics, Inc., 541 Lexington Avenue, New York 22, N. Y. ■



DYKOR PHOTOELECTRIC PERFORATED TAPE READER

The Dykor Model C301 photoelectric perforated tape reader is available in versions to handle any one of the standard punched tape widths. Reading speeds range from 100 characters per second to 750 characters per second. A fast start-stop feature permits intermittent reading of tapes at slower rates. Short strips, requiring only six inches of leader, may be

used. Digitronics Corporation, Albertson Avenue, Albertson, Long Island, N. Y. ■

UPTIME SPEEDREADER 2000

Philco Corporation and the Uptime Corporation have jointly developed a new high speed punched card reader. It will be marketed by Uptime under the trade name "Speedreader 2000." It will read conventional punched cards, row by row, 80 columns wide, at the rate of 2000 cards per minute. This is a substantial increase over current card reading speeds and should find applications both as an input to high speed electronic computers and in conventional tabulating installations. Uptime Corporation, Rawlins, Wyoming. ■

TALLER & COOPER DATA PROCESSOR

The Taller & Cooper Data Processor will accept fixed information from master tabulating or edge-punched cards and variable information from a keyboard; the data is combined to produce a punched paper tape. The paper tape can be used in subsequent processing, or can be converted to punched cards. One application is the elimination of detail cards kept in tub files *(see article on Special Purpose Equipment in this issue.)* Taller & Cooper, Inc., 75 Front St., Brooklyn 1, N. Y. ■

SYSTEMATICS, INC. TAPE-TO-CARD CONVERTER AND INPUT DEVICE

Systematics, Inc. of New York and Los Angeles used the National Business Show to spotlight two of their recent advances in integrated data processing, the C 749 Tape-to-Card Converter and their Input Device, N-500—N-700 series.

The new Converter features a removable wired plugboard, having ten selectors and ten distributors to control card punching. A second plugboard handles tape that has been punched with any type code.

A validity check feature automatically checks each code for accuracy.

The Converter is attached to the standard IBM 024 or 026 card punch in such a way that normal operation of the card punch is not obstructed. It can also be attached to a card punch having the Self Checking Number Device. In this case, selected indicative data is automatically verified.

The Input Device connects a card or tape reader to a National Cash Register general purpose accounting machine. As the punched cards or tape are read, the typewriter keyboard and the counters of the accounting machine are automatically activated, and will print hard copy reports. The printing takes place at approximately 10 characters a second.

This system can be further integrated by the introduction of an output intercoupler. This will connect the accounting machine to a card or tape punch. As the machine prints its report, detail cards are punched automatically. This series of Systematics intercouplers will accept as input, punched cards, edge punched cards or punched tape containing both numeric and alphanumeric information. They will produce cards or tape as output. ■

MULTI-RITE ACCOUNTS RECEIVABLE SYSTEM

A new one-writing system for accounts receivable recordkeeping has been announced by the C. E. Sheppard Co. One writing simultaneously records each transaction on both ledger and journal. The forms are aligned on a pegboard to insure precise registration. When a statement is desired the ledger card is fed into the copying machine and produces an exact copy almost instantly. The ledger card is designed to look like a statement. A variety of journal sheets are available for most business applications. The C. E. Sheppard Co., 44-38 Twenty-First St., Long Island City 1, N. Y. ■

NCR'S CHECK SORTER

A production model of a machine which sorts checks at the rate of 7,500 an hour has been demonstrated by the National Cash Register Company. This is an outstanding improvement over hand-sorting rates of about 500 an hour. The sorter utilizes numbers and symbols printed on the check in magnetic ink, which can be read by both machines and the human eye. The system follows American Bankers Association's recommendations for a "common language" among banks.

The sorter represents one step in the automatic handling of the ten billion checks which flow annually into United States banks. For sorting purposes every bank depositor is identified by an account number printed in magntic ink at the bottom of his checks. A future development will allow the amount to be placed on the check, using the same type of ink; this would permit automatic posting.

The check sorter was jointly developed by Pitney-Bowes, Inc., and NCR; the General Electric Company supplied the electronic reading mechanism. The sorter can process intermixed documents of varying length, width and thickness, including punched cards, and can also handle mutilated items. An advantage of magnetic character reading is that the development will enable banks and other business firms to retain their present conventional-type business forms. The first model will be used in the Bank of America's forthcoming ERMA system. The National Cash Register Company, Dayton 9, Ohio. ■

PEOPLE AND PLACES

TOP CHANGES AT IBM

So that Executive Vice-President L. H. LA MOTTE may concentrate on the affairs of general management, McLAIN B. SMITH has been made Vice President and General Manager in charge of IBM's Data Processing Division. Both men are members of the Corporate Management Committee. GILBERT E. JONES has been upped to Assistant General Manager.

STANDARD REGISTER

EDWARD H. KANN has been named Special Product Manager for the Stanomatic. He will be in charge of sales and marketing for the complete Stanomatic System . . . Standard Register dedicated its new Fayetteville, Arkansas plant recently.

EL-TRONICS APPOINTS

FRED GARCELON has been named Executive Vice-President of El-Tronics, Incorporated, Hawthorne, California, directing all its marketing activities, in addition to the normal executive load.

PHILCO APPOINTS ADVERTISING CO-ORDINATOR

ALBERT V. FUERSTEIN, JR. has been placed in charge of all phases of Philco Corporation's Government and Industrial Division advertising and sales promotion activities.

NEW DEVELOPMENT DIRECTOR AT TELEMETER

MILTON ROSENBERG, with Telemeter Magnetics, Inc. of Los Angeles, has been named their Director of Advanced Development . . . Mr. Rosenberg's accomplishments include outstanding efforts toward development of ENIAC, the first practical electronic computer, at the University of Pennsylvania in 1946.

AMERICAN THREAD GETS DATA PROCESSING HEAD

A. J. EASTWICH is the new Data Processing Manager for the American Thread Company, filling a key post in the firm's newly adopted ADP system.

STROMBERG-CARLSON NEWS

HAROLD P. FIELD has been appointed Director of Marketing of the Electronics Division. He continues his duties of General Managering Stromberg-Carlson's San Diego plants . . . He named WILLIAM G. ALEXANDER Assistant General Manager of Stromberg-Carlson — San Diego . . . In Los Angeles, HOWARD S. GLEASON has been appointed Manager of the firm's Electronic Control Systems plant.

BURROUGHS-CANADA

J. L. RAPMUND, General Manager, Burroughs Adding Machine of Canada, Ltd., Toronto, has been elected to the Board of Directors of that firm and Burroughs Machines, Ltd., Windsor, Ontario. His responsibilities were broadened to cover all Burroughs operations in Canada, including the sale and service of Burroughs 205 and 220 digital computer and auxiliary devices.

■ ■ ■

OUTPUTS

ITEMS OF INTEREST FROM HERE AND THERE

IBM LEASES PRIVATE WIRE SYSTEM

IBM is leasing a 25,000-mile private wire telegraph system from Western Union.

The new high-speed network provides fast and efficient communications between all IBM points and with IBM world headquarters at New York City, where the message center of the system will be located. About 250,000 words a day flash over the new IBM network, enabling headquarters to maintain close control of the organization's activities.

The message center at IBM world headquarters is of building block design to permit unlimited expansion to meet growth of business.

MACHINE SIMULATES HUMAN BRAIN

There are indications that a laboratory model of a machine operating on the principle of the human brain is possible. Under Office of Naval Research contract, Dr. Frank Rosenblatt, a research psychologist at Cornell, conceived the "perceptron." This is a crude, visual sensory device capable of forming spontaneous concepts based on its observations of visual forms and attaching meaningful symbols to things that it sees.

Using an IBM 704 to simulate a "perceptron" system, simple experiments demonstrated the machine's ability to recognize items, *without* matching them against a stored inventory of similar items previously fed into it by an operator, nor by performing a mathematical analysis of characteristics. Instead, the recognition is direct, and essentially instantaneous, since the association by which a perceived stimulus is identified is derived in the form of new pathways through the system rather than from a coded representation of the original stimulus. This is much like a man who gets a direct view of an object through his eyes from which impulses flow through his nervous system to the brain, in turn enabling him to instantly recognize and identify that object for someone.

BANKING AUTOMATION

J. A. Mermis, Jr., President of the *Security State Bank of Great Bend, Kansas,* says that a majority of bankers delay adoption of electronic posting because "fancy nomenclature" has them thinking alpha-numeric installation is a complicated problem. In a talk before the Kansas Bankers Association, he asserted the problem is "very simple," citing his own experience, and urged that several alpha-numeric systems be studied by bankers . . . . Australia's *State Savings Bank of Victoria* has ordered Burroughs' Sensimatic machine. The management expects the bank bookkeeping machine to release officers from normal manual operation for more senior positions in a company whose growth reflects the nation's expansion . . . . Twenty-two Sensitronics, Burroughs' electronic dual-printer machines, have been ordered by *Provident Tradesman's Bank and Trust Company of Philadelphia* . . . . In Detroit, the *National*

Bank completed and placed in operation the first installation anywhere of Burroughs' high speed electronic bank proof machines . . . . America's oldest chartered bank, the *First National Bank of Boston,* is using the Datamatic 1000, designed, built and installed by Minneapolis-Honeywell Regulator Company. When used with special equipment installed to read information printed in magnetic ink, the machine's versatility will enable it to convert the work of big-volume departments to dot-dash electronic language, processing the regular checking accounts for 70,000 depositors.

BURROUGHS DISPLAYS BANK EQUIPMENT

Based on the theme "New Dimensions in Electronic and Data Processing Systems," Burroughs Corp. devoted the entire 80 feet of its ABA Convention exhibition in Chicago's Conrad Hilton Hotel to the showing of all electronic banking equipment, including a large scale computer system in full operation. The Chicago National Bank cooperated in a "tie-in" display by throwing open its Burroughs electronic bank bookkeeping system installation for inspection by ABA visitors during the convention.

USEFUL LITERATURE

For your convenience in obtaining pertinent and helpful information on the latest equipment, forms, services and related products in the data processing field, we direct your attention to the following free literature available from the manufacturers. Circle the numbers pertaining to the literature you wish to receive on the Reader Service Card appearing elsewhere in "MA & DP." Mail the card to us and we will speedily forward your requests.

STOCK FORMS and how to use them profitably are the subject of a 48-page catalog by Standard Register Company called "Stanreco Stock Business Forms." It illustrates forms covering all the basic functions of business. Description and outline of suggested uses accompany each form . . . Standard Register Company, Dayton 1, Ohio.

Circle No. 16 on Reader Service Card.

PAYROLL APPLICATIONS may be well-served by Rem-Rand Univac Division of Sperry Rand who offer a 50-page booklet, "Unmeasured Daywork Payroll on the Univac 120 with Labor Distribution Cards as a By-Product." . . . Remington Rand, 315 Fourth Ave., New York 10, N. Y.

Circle No. 17 on Reader Service Card.

PUNCHMARKING SYSTEMS, questions most frequently asked about, are the subject of A. Kimball Company's excellent booklet of their IDP punched tags . . . A. Kimball, 8 Rewe St., Brooklyn, N. Y.

Circle No. 18 on Reader Service Card.

PROGRAMMING THE UNIVAC FILE-COMPUTER is described in a comprehensive 249-page manual just published. Prepared for programming personnel, the manual may also be valuable to businessmen considering using the File-Computer. The latter may borrow it from any Rem-Rand branch office . . . free to users . . . Remington Rand, 315 Fourth Ave., New York 10, N. Y.

Circle No. 19 on Reader Service Card.

CARBON-FEEDMASTERS for use on IBM electric accounting machines are described in the catalog which accompanies an excellent little booklet on control panel wiring for automatic control of the Carbon-Feedmaster . . . Carbon-Feedmaster Company, Eureka, Ill.

Circle No. 20 on Reader Service Card.

THE MOORE STORY, a biography of the business forms company, gives a picture of the general development of business procedures as well as the personal data . . . Moore Corporation, Ltd., Toronto 1, Canada.

Circle No. 21 on Reader Service Card.

ADDRESSING AND DATA WRITING, Advanced Approach to . . . is the title of a new six-page color brochure published by Scriptomatic, Inc. It describes the use of electronic selective controls to read, sort and count—skip or print—at a single run through the addressing machine. Also describes attachments

for various data writing needs . . . Scriptomatic, Inc., 310 N. 11th St., Philadelphia 7, Pa.

Circle No. 22 on Reader Service Card.

proFILE APPLICATIONS RESEARCH BULLETIN explains in some detail the new "Case and Component" approach for Data Processing Materials Storage, i.e., Custom Built Equipment at Production Cost —the customer actually can design his own equipment to meet his specific needs . . . Ray Myers Corporation, Endicott, N. Y.

Circle No. 23 on Reader Service Card.

HOME STUDY COURSE in programming business computers, designed for people without technical training or experience, is described in a brochure available from Business Electronics, Inc., Programming Section, 420 Market St., San Francisco 11, Calif.

Circle No. 24 on Reader Service Card.

"THE MECHANIZATION OF FILING AND FINDING" is a booklet covering in detail three basic forms of mechanization for the storage and retrieval of information especially adapted to the handling of written records such as cards, papers, etc., but also usable for the handling of tapes and other related media. . . . Wheeldex & Simpla Products, Inc.

Circle No. 25 on Reader Service Card.

CARD PRICE LIST-CATALOG available from Electronic Accounting Card Corp. notes one-day service on most stock cards. Sample cards and layout sheets provided at no charge . . . Electronic Accounting Card Corp., High Point, N. C.

Circle No. 26 on Reader Service Card.

SHELBY "TABSETS," individual one-time carbon unit sets incorporating one or more tabulating cards, are described in a brochure available, together with actual samples of these forms which feature the "Thumb Notch" for easy carbon extraction . . . The Shelby Salesbook Company, Shelby, Ohio.

Circle No. 27 on Reader Service Card.

DATA PROCESSING ACCESSORY EQUIPMENT, Catalog 20, and Supplement to Catalog 20, include a complete line of data processing accessory equipment manufactured by Wright Line, Inc., 160 Gold Star Blvd., Worcester, Mass.

Circle No. 28 on Reader Service Card.

IDP PRODUCTS IN ACTION, a handbook on the Friden Flexowriters, illustrates a number of systems in which data are stored in coded punched tape and made self-perpetuating. The language is unusually clear and simple . . . Friden, Inc., 2350 Washington Ave., San Leandro, Calif.

Circle No. 29 on Reader Service Card.

DATA PROCESSOR, manufactured by Taller & Cooper and obviating the need for tub files, is concisely described and well-illustrated in the company's brochure . . . Taller & Cooper, Inc., 75 Front St. Brooklyn 1, N. Y.

Circle No. 30 on Reader Service Card.

PROGRAMMING the ALWAC III-E Computer, an eight-page booklet, describes the basic steps in programming a digital computer. It illustrates block diagrams, flow charts, data sheets, coding sheets . . . Alwac Corporation, 13040 So. Cerise Ave., Hawthorne, Calif.

Circle No. 31 on Reader Service Card.

A FORMS INVENTORY AND SPECIFICATIONS book is offered by The Baltimore Business Forms Company to readers who are seeking a better way to control the use and purchasing of forms. The form helps determine the proper re-order date, the exact quantity to buy, etc. Backing each inventory page is a complete specifications page, which makes it easy to requisition forms made to exact needs . . . Baltimore Business Forms, 3128 Frederick Ave., Baltimore 29, Md.

Circle No. 32 on Reader Service Card.

THE "WHY" booklet offers a complete description of Electronic Accounting Card Corp. production . . . EAC, High Point, N. C.

Circle No. 33 on Reader Service Card.

ROTARY FILE CATALOG includes new Wright Rotaries with 30 different models . . . Wright Line, 160 Gold Star Blvd., Worcester, Mass.

Circle No. 34 on Reader Service Card.

IBM 7070 (see article on page 37) is previewed in colorful eight-page brochure . . . IBM, 590 Madison Ave., New York 22, N. Y.

Circle No. 35 on Reader Service Card.

DATA PROCESSING AUXILIARY EQUIPMENT and TAPE HANDLING AND STORAGE EQUIPMENT are described in Catalog 4 which contains illustrations, specifications and descriptions of Monarch data processing equipment for use with punched card and magnetic tape, including the "Filaway" line . . . Monarch Metal Products, Inc., MacArthur Ave., New Windsor (Newburgh), N. Y.

Circle No. 36 on Reader Service Card.

STOCK BUSINESS FORMS, snap-apart and tabulating, are amply described in the 1958 catalog issued by Alfred Allen Watts Co., Inc., Allwood, Clifton, N. J.

Circle No. 37 on Reader Service Card.

ALL-TRANSISTOR COMPUTER line manufactured by Philco Corporation is described in a series of brochures giving the features, facts and figures about the TRANSAC S-2000, C-1100 and C-3000 . . . Philco Corporation, Philadelphia 44, Pa.

Circle No. 38 on Reader Service Card.

"PRIVATE WIRE SYSTEMS AND IDP" is a 25-page pamphlet which clearly outlines the role communications is playing in data processing, how wire systems are set up, illustrates the equipment and gives charts and sample rates . . . The Western Union Telegraph Company, 60 Hudson St., New York 13, N. Y.

Circle No. 39 on Reader Service Card.

TAPE HANDLING AND STORAGE brochure illustrates equipment of Wright Line, 160 Gold Star Blvd., Worcester, Mass.

Circle No. 40 on Reader Service Card.

CARBON SEPARATOR AND DECOLLATOR for use with any tabulating machine is pictured and described in literature issued by the manufacturer, Dillon-Ford & Co., 154 Nassau St., New York 38, N. Y.

Circle No. 41 on Reader Service Card.

HAND STAINS are easily removed with "Spirit Away" sheets . . . convenient and economical. Samples available from Kee Lox Manufacturing Co., Rochester 1, N. Y.

Circle No. 42 on Reader Service Card.

FLOOR PLANNING brochure describes the Wright Line floor planning free service, which includes an overall view of the entire department using three-dimensional scale models . . . Wright Line, Inc., 160 Gold Star Blvd., Worcester, Mass.

Circle No. 43 on Reader Service Card.

MULTIPLYING THE OUTPUT of tabulators, printers and computers with Multilith Masters is the subject of a 14-page booklet prepared by Addressograph-Multigraph to illustrate the methods of increasing data printer output by making more pro-

CALENDAR of Coming Events

1958

Nov. 3-7 Fifth Institute on Electronics in Management
American University, Washington, D. C.

Nov. 4-5 Industrial Management Society
"Executive Techniques for Industrial Engineering Seminar"
Hotel Sherman, Chicago, Illinois

Nov. 10-14 Paperwork Simplification Conference
University of Dayton, Seminar Room,
Wohlleden Hall, Dayton, Ohio

Nov. 16-21 International Conference on Scientific Information
Mayflower Hotel, Washington 25, D.C.
Contact: National Academy of Science
2101 Constitution Avenue, N.W.
Washington 25, D. C.

Nov. 28-Dec. 4 Computer Exhibition & Business Symposium
Contact: Exhibition Organizer
11/13 Dowgate Hill
London, E.C. 4, England

Dec. 3-5 Eastern Joint Computer Conference
Bellevue-Stratford Hotel, Philadelphia, Pa.

Dec. 10-12 Conference on Profit Improvement through Effective Cost Management
American Management Association
Ambassador Hotel, Los Angeles, Calif.

1959

March 2-4 Special Electronics Conference
American Management Association
Hotel Statler, New York, N. Y.

March 3-5 Western Joint Computer Conference
Fairmont Hotel, San Francisco, Calif.
Contact: M. L. Lesser
I.B.M. Research Lab
San Jose, Calif.

April 2-4 Joint Meeting Institute of Mathematical Statistics (Central Region) and Association for Computing Machinery
Case Institute of Technology, Cleveland, Ohio

June 13-21 First International Conference on Information Processing (ICIP)—Europe
Contact for U. S. Committee of ICIP:
I. L. Auerbach
Auerbach Electronics Corp.
109 North Essex
Narbeth, Pa.

ductive use of time available on the printers . . . Addressograph-Multigraph Corporation, Cleveland 17, Ohio.

Circle No. 44 on Reader Service Card.

ELECTROSTATIC NEUTRALIZER to control static in office machines is described in the literature offered by the manufacturer of "Magic Wand" . . . Dillon-Ford & Co., 154 Nassau St., New York 38, N. Y.

Circle No. 45 on Reader Service Card.

PARTITIONS for use in machine accounting or data processing installations . . . fabricated of aluminum, fibreglass, glass, and panels . . . are described in the illustrated brochure available from Monarch Metal Products, Inc., MacArthur Ave., New Windsor (Newburgh), N. Y.

Circle No. 46 on Reader Service Card.

CHECK-A-LINE GUIDE, a four-page brochure, illustrates use of the guide to ease eyestrain in copying or checking. Guide can be used for checking work up to 17" wide . . . Kee Lox Manufacturing Co., Rochester 1, N. Y.

Circle No. 47 on Reader Service Card.

CARD HANDLING is discussed in brochure available from Wright Line, 160 Gold Star Blvd., Worcester, Mass.

Circle No. 48 on Reader Service Card.

CARBON RIBBON information . . . on the new Execu-Tape M-50 Style Ribbon for use on all carbon ribbon equipped machines—with non-breaking feature — distributed by Columbia Ribbon & Carbon Mfg. Co., Inc., 710 Herb Hill Rd., Glen Cove, N. Y.

Circle No. 49 on Reader Service Card.

FORMS BURSTER, the Mark II, which bursts at top speed of 12,500 per hour, is described in literature available from Dillon-Ford & Co., 154 Nassau St., New York 38, N. Y.

Circle No. 50 on Reader Service Card.

VISIBLE RECORD KEEPING as developed by Visirecord, Inc., is described in a well-charted 12-page booklet. On request, the company will supply a complete kit including sample cards, descriptions and illustrations of card, punched tape, plastic tape channels, and "Visisleeve" tape channels to be used in common language data processing machines . . . Visirecord, Inc., Copiague, L. I., N. Y.

Circle No. 51 on Reader Service Card.

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WORLD-WIDE DATA PROCESSING

DURING the past three or four years, the editors of MACHINE ACCOUNTING and DATA PROCESSING have rendered assistance to the United Nations editors in the development of a series of data processing studies. It is indeed satisfying to see the material finally approaching the publication stages.

1. "The Elements of Planning and Operating a Punched Card Installation" is in fact a very thorough checklist of points to be considered when installing a system. It encompasses such topics as budget, organization, research and development, determination of staff and equipment requirements and the appraisal of the efficiency and effectiveness of processing services.
2. "Planning, Organizing and Administering Data Processing Services" is a comprehensive discussion of the required decisions, considerations and actions necessary in planning, organizing and administering data processing services where there has been no previous experience in this field. Together with the more commonplace considerations, such points as the availability of foreign exchange hours of power supply availability, inland transportation time including transportation by camel, bullock cart or other primitive means, preservation of records when exposed to polluted air conditions and protection of materials from rodents, insects and other pests are discussed.

The above two studies are part of a series of twelve studies which are being prepared to help solve the data processing difficulties experienced by many less developed countries. The titles of the proposed studies are:

1. Scope and Principle Methods for Data Processing.
2. Planning, Organizing and Administering Data Processing Services.
3. The Elements of Planning and Operating a Punched Card System.
4. Manual Methods and Tools for Data Processing.
5. Source Documents — Their Design and Location.
6. Codes and Coding Techniques.
7. Punched Cards (Types and Design).
8. Punching and Verifying.
9. Punched Card Sorting.
10. Auxiliary Punched Card Machines.
11. Punched Card Tabulating Machines.
12. Supervision of the Machine Department.

The first three studies will be prepared for senior Government officials to assist them in making financial, administrative, organizational and other decisions. The remainder of the studies will deal with methodological and other processing aspects, and are intended for the use of supervisory and operating personnel of the processing department. To enable the above studies to be utilized in the 1960 World Census Program, they are issued and distributed separately in provisional form as each study is completed. At a later date it is intended to amend the studies and to publish them in the form of a handbook. For further information regarding these studies, contact Mr. C. K. Dilwali, Chief Data Processing Methods, FAO, Rome, Italy. ■

MA & DP BOOK SHELF

INSTRUMENTS FOR MEASUREMENT AND CONTROL by Werner G. Holzbock, Reinhold Publishing Corp., 430 Park Ave., New York, 416 pages, $10.00

This book is recommended as an excellent source of information in the field of instrumentation. At first glance this subject may seem to be of little concern to most of our readers; however, many new applications today are overlapping the fields of data processing and automation. The book describes and illustrates all of the most recent devices for measuring and controlling temperature, moisture, pressure, flow, etc. In non-mathematical language the design, construction and operation of instruments are discussed. A special chapter on Trends is devoted to the development of centralized systems, miniaturization and digital computers.

ELECTRONIC COMPUTERS AND MANAGEMENT CONTROL by George Kozmetsky and Paul Kircher, Associate Professor at University of California, McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 36, N. Y., 296 pages, $5.00

This practical book, written primarily for the business executive, does not require a technical background for comprehension. It tells how computers operate and how they may be applied to business problems. Planning and control decisions using electronic data processing systems are included and practical help in selecting electronic data processing systems is suggested. The performance of major components of the system, including input, processing, storage, control and output is defined.

The fundamental characteristics of electronic systems and the basic concepts of the scientific methods of analysis are described. Administrative problems experienced in introducing computer systems, management planning and control, programming, scheduling and feedback are among some of the special features.

INTEGRATED COST CONTROL IN THE OFFICE by Frank M. Knox, Management Consultant, McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 36, N. Y., 304 pages, $7.50

Methods of organizing a systematic program integrating the individual efforts of the entire office staff are spelled out in this handy guide to Office Management. This is the fourth in the NOMA management book series. It offers practical techniques for reducing and controlling costs in addition to defining the office cost control problem.

The author stresses control over forms, methods and procedures, clerical work measurement, work simplification and automation in the office.

The methods presented are not theoretical; they have been tested and proved in business organizations of various sizes. Members of the office staff can follow and apply these methods directly and achieve worthwhile results in the reduction of paperwork and office expense.

Tables of Typical Record Retention Periods and an Evaluation Check List for Office Cost Control are included.

A SECOND SURVEY OF DOMESTIC DIGITAL COMPUTING SYSTEMS by M. H. Weik, Ballistic Research Laboratories, Report No. 1010, Office of Technical Services, United States Department of Commerce, 437 pages, $7.00

This report supersedes BRL Report No. 971 and is a handy reference book providing the results of a survey of the engineering and programming characteristics of 103 different digital computing systems.

Data presented on each system comprise the application, performance characteristics, construction and checking features, personnel requirements, installations, sale and lease policy. Included in this volume is a discussion of trends, comparative table of operation time, word length,

access time for various systems, and an invaluable glossary of computer engineering and programming terminology.

A MANAGEMENT GUIDE TO ELECTRONIC COMPUTERS by William D. Bell, Consultant on Electronic Data Processing, Mellonics, Van Nuys, California, McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 36, N. Y., 403 pages, $6.50

The realistic, important facts about the uses of electronic computing systems in business are spelled out in this first-hand information guide. The jobs possible for data processing set-ups are developed as case histories with actual experiences to substantiate them.

Programming features of the computer and what constitutes a data processing machine are summarized in this book. The author explains input and output devices, memory, arithmetical and logical functions and printing devices.

Other management questions such as personnel, cost, checking, maintenance and repair are answered factually. The book has been written to give the businessman and the executive the kind of information which they want and need to know.

GLOSSARY OF AUTOMATION TERMS, prepared by the National Office Management Association's Automation Committee, NOMA, 1931 Old York Road, Willow Grove, Pa., 38 pages, $2.00.

This is a practical reference guide . . . some 500 words and phrases applying to automatic data processing are defined.

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We welcome your comments and criticisms on this and future issues and the articles appearing in them to help guide our purpose and for use in the LETTERS to the EDITOR Department which will appear regularly starting in an early issue

INDEX TO ADVERTISERS

EDITORIAL

WHAT'S IN A NAME?

By Eugene F. Murphy

DURING the past ten years of rapid development in the field of Machine Accounting and Data Processing, there has come into general use a wide variety of names identifying it.

Among those most commonly used and with which you are undoubtedly familiar are automated data processing *(ADP)*, integrated data processing *(IDP)*, electronic data processing *(EDP)*, office automation and the not-so-recent designations, machine accounting and tabulating. While each of these terms might justify its existence in that it most accurately describes either an overall or a specific phase of the field, there are few who will not agree that the existence of so many terms has caused considerable confusion and misunderstanding.

In a field where efficiency ranks as a virtue, it seems to us that an effort should be made to help simplify and clarify this situation.

In attempting to select a term that would be general enough to include all phases of the field and at the same time descriptive enough to exclude those phases not of specific interest, it might be well to look for a definition of the *functions* that are usually performed by those engaged in this area of activity and then seek a term which best describes those functions.

We submit a definition which seems to encompass the activity of all persons who employ punched card, punched tape, computer and related equipment, and those who are responsible for the planning and systematizing of these activities, to wit: "the preparation and processing of information utilizing equipment that operates automatically and at high speed."

We submit further as the simplest term describing this function — DATA PROCESSING.

Of course, the terms "integration" and "electronics" have a necessary place in our vocabulary but these words seem to be best used to describe a particular concept or specific function rather than to describe the field itself.

The term *tabulating* has been used for many years and is not one that is likely to fade completely in the immediate future. No one likes to see an old friend leave the scene. However, this term and its more recent counterpart, *machine accounting*, are both very limiting. "Machine accountants" frequently process important data where no true accounting function is performed. And their activities are no longer strictly related to the machine functions. Certainly the planning and preparatory stages of the operations are highly significant. *Automation* includes factory as well as office activity and is probably more closely allied to factory operations.

We believe, therefore, that the term DATA PROCESSING is a befitting designation for the field. The practitioners in the field may be appropriately referred to as managers, supervisors, directors or vice-presidents of DATA PROCESSING.

You may ask then, why this publication is entitled MACHINE ACCOUNTING and DATA PROCESSING.

It is not for us to decide by what term the field will be popularly known. As a publication title, the combination of the two terms which we feel presently have the strongest appeal has been selected.

This publication is designed to serve those persons who have the responsibility for efficiently planning and supervising the "processing of data" using automatically operated high-speed equipment of a variety of types *regardless of what name they use in designating their activities.*

Your comments, criticism and suggestions on this subject are welcome and we will, of course, be guided by your wishes.

Forgive our lack of ingenuity as we refer throughout this magazine to specific areas of operations simply as punched card, punched tape or computer activities rather than the more complex terms frequently employed. We will use the term DATA PROCESSING when referring to the field in the broader sense. ■

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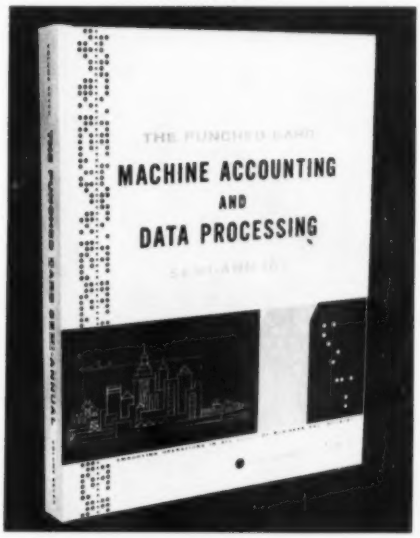

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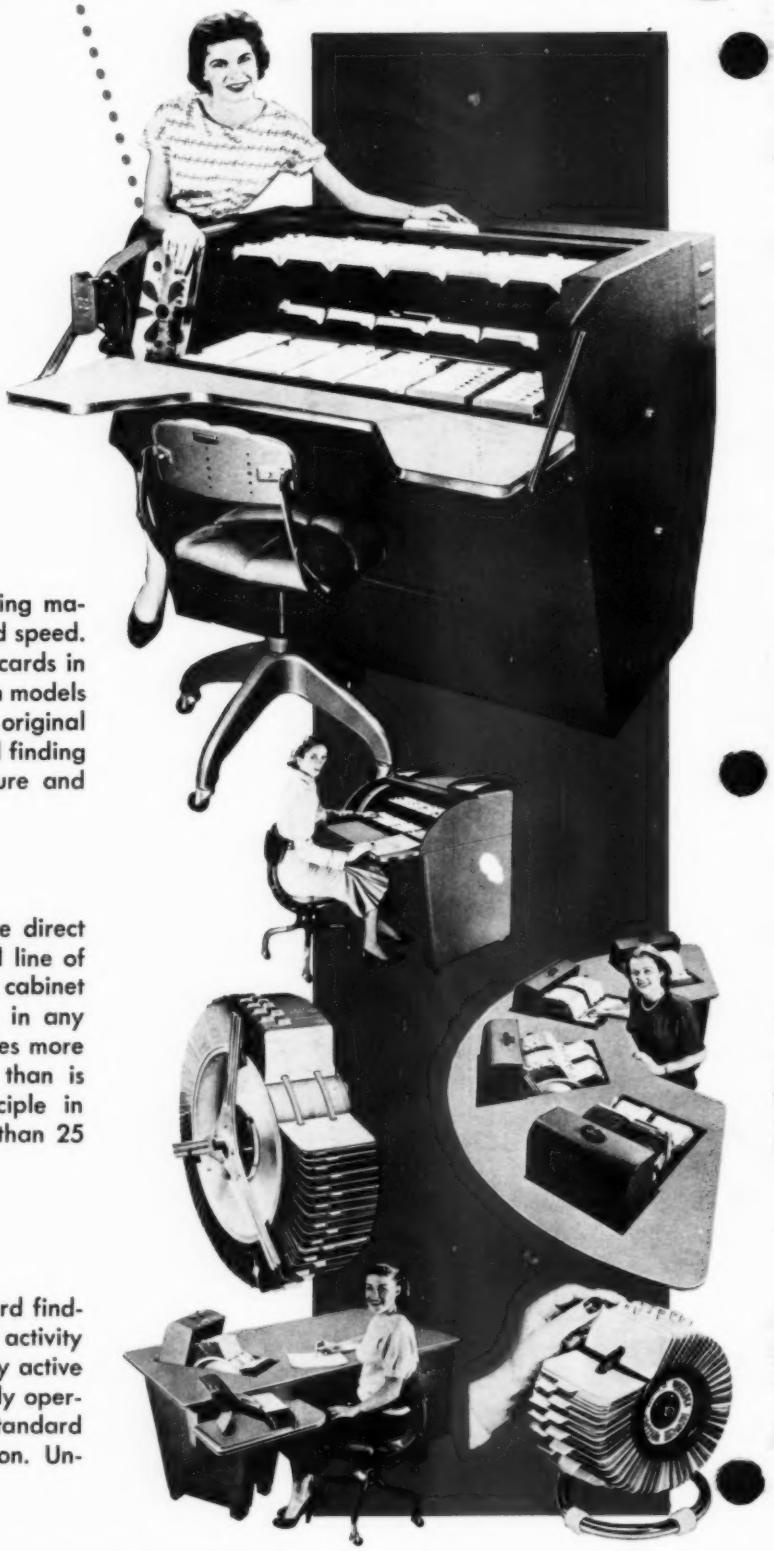

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